THE IRON TRADE REVIEW

Single Copies 15 Cents — CLEVELAND, AUGUST 10, 1916 — Four Dollars a Year

AUG 10 1916
UNIV. OF MICH. LIBRARY

THE ELECTRIC STEEL CASTINGS CO.

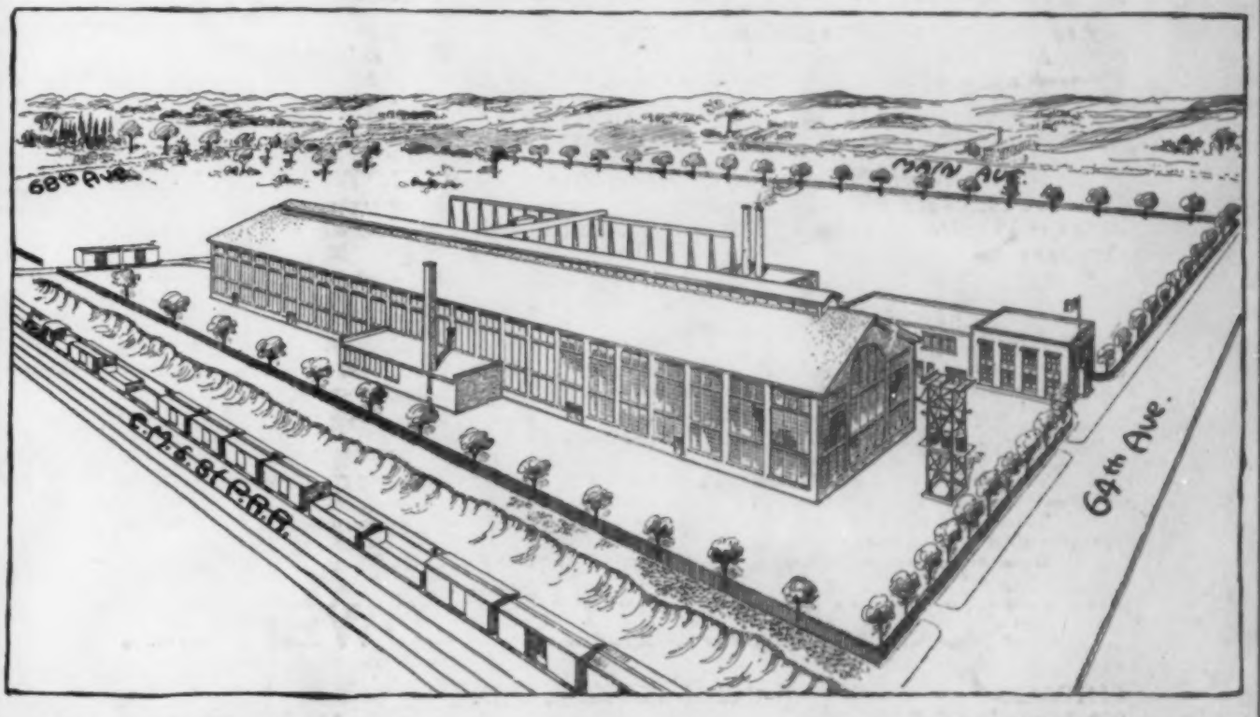
(Now building)

Milwaukee — Wisconsin

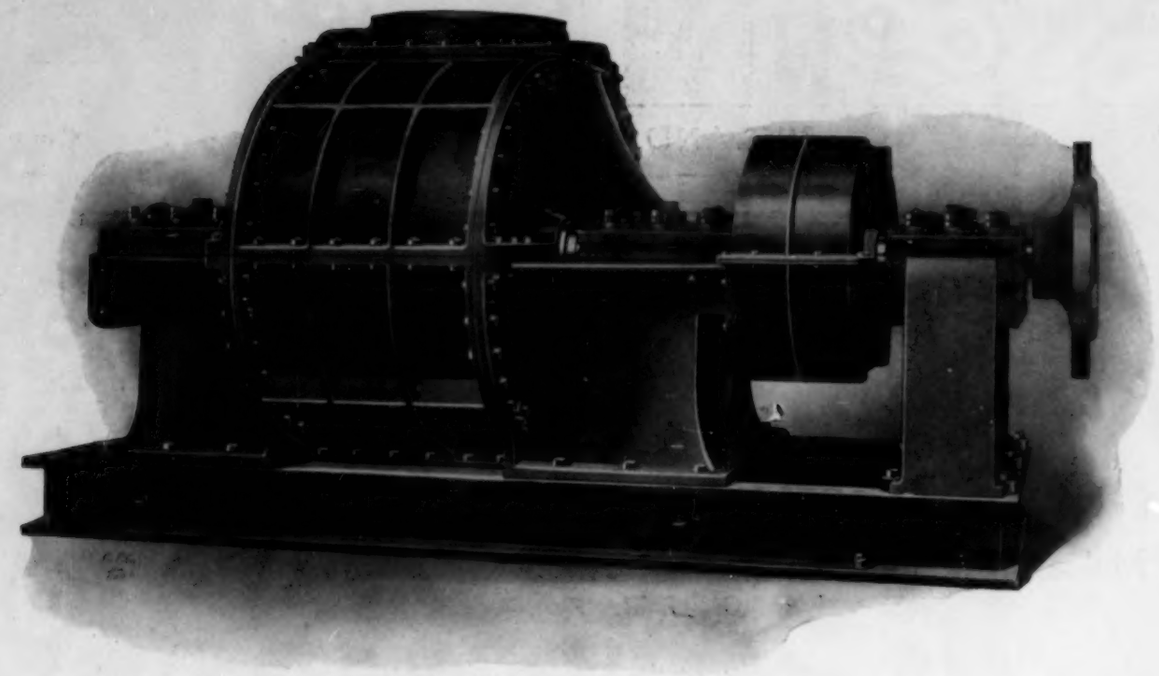
LEO G. SMITH, Pres. and Gen. Mgr.

Capacity: 500 Tons Electric Steel Castings Per Month

Commencing Jan. 1917



Alphabetical list of Advertisers, page 150. Table of Contents, page 35. "Where-to-Buy," page 104.
Opportunities, pages 144-146. Second-Hand Machinery, pages 147. Manufacturing Sites, page 148.
Fill-in and Contract Work, page 149. Engineering Directory, page 136.



Connersville High Pressure Gas Pump

CONNERSVILLE

Gas Pumps, Exhausters and Boosters

CONNERSVILLE GAS PUMPS, EXHAUSTERS and BOOSTERS are exceptionally advantageous wherever gas is handled.

Altho they are the type of simplicity, they possess all the features of practical construction, resulting from years of experience.

CORRECT

The testimonials which we have received from users of CONNERSVILLE PUMPS, EXHAUSTERS and BOOSTERS, prove that "Connersville" products are correct both in design and service. Many state that they out-work as well as out-last the best pumps that they have ever been able to obtain.

EFFICIENT

Their range of capacity is from 25 to 40,000 cu. ft. per minute, and their pressure range is from ½ to 10 pounds. There is no lost motion—all motion is rotary, parts being carefully balanced and separated by accurately gauged clearances. There are no valves, no springs and no internal parts requiring lubrication.

SERVICEABLE

The service to which CONNERSVILLE PUMPS, EXHAUSTERS and BOOSTERS can be put, is almost unlimited. They can be used for handling air, gas, steam, water and all other fluids.

These pumps may be driven by belt, by direct connected steam engine, by electric motor direct connected or through gear and pinion, or by silent chain.

If you wish correct and efficient pump service write for a "CONNERSVILLE" catalog.

THE CONNERSVILLE BLOWER CO.

CHICAGO
929 Monadnock Bldg.

CONNERSVILLE, IND.

NEW YORK
114 Liberty Street

THE IRON TRADE REVIEW

Vol. LIX Cleveland, August 10, 1916 *No. 6*

May Cause Shortage of Pig Iron

Foreign Demand for Bessemer Continues—Considerable Buying of Basic—Great Activity in Shell Steel and Finished Shells

THE continued strong demand for bessemer pig iron for export, the domestic buying of basic and the fact that numerous furnaces will soon be compelled to blow out for re-lining, indicate the possibility of a shortage of steel-making pig irons before the close of the year. Already some anxiety is being expressed in the Chicago district. Aside from the buying of considerable tonnage of basic in the Pittsburgh district and fair inquiry for foundry grades, the pig iron market continues dull, but the outlook for increased demand is much more favorable. Southern iron is the one weak feature.

The evidence accumulates that the supply of semi-finished steel will fall far short of meeting the demand. Some leading manufacturers express the opinion that there will be the largest shortage of steel this winter that the country has ever seen. It is also apparent that much new finishing capacity, especially for plates, will be necessary. Government representatives, who have been sounding the mills as to quick delivery on 4,000 tons of structural material for navy yard requirements, have not received satisfactory promises.

Coke

Owing to the extreme heat of the past few weeks, much difficulty has been experienced in getting laborers in the coke regions to continue at work. The demand for by-products is active and a New York firm has sent out an inquiry for 225,000 gallons of toluol and 125,000 gallons of benzol.

Shell Steel

The tonnage of steel for shells, which is now being actively sought, is tremendous and the prospects for highly profitable business are very promising. The market, in fact, has become feverish and many buyers are excited as to how and when they will be able to cover for their requirements. It is estimated that fully 500,000 tons are now pending. One mill reports definite inquiries for 200,000 tons. French munition manufacturers have contracted with the Steel Corporation for a large tonnage of rounds for delivery over the first half of next year. A fifteen million dollar contract for 6-inch shells has been placed with the Baldwin Locomotive Works, which is now in the market for 26,000 tons of steel rounds from which to make the shells. Other very large contracts for shells have been placed. Mills have already taken so many orders for shell steel that they can take only limited tonnages for the first quarter or half of next year.

Railroad Buying

Owing to the fact that rail mills have been used largely in rolling rounds for use in the manufacture of munitions, some of the mills are falling behind in their deliveries of rails and have been trying to buy from each other in order to fill their contracts. There is some talk of car buying, but business develops very slowly.

Steel Pipe

The California Oil & Gas Co. has placed contracts for 450 miles of 10-inch steel line pipe, calling for 50,000 tons, and contracts for pipe to be laid in West Virginia require about 9,300 tons. Inquiries for considerable tonnages of cast iron pipe for export to Cuba and other foreign countries are pending.

Plates, Shapes and Bars

Following the advance of $2 per ton in price of shapes, plates and bars, specifications have been very heavy and the pressure for deliveries has been strong. The advance in bars has had the effect of eliminating all chance of implement manufacturers making contracts at less than 2.50c, Pittsburgh. It is possible that the advance on shapes will check building operations and cause the adoption of concrete construction in place of steel in some cases. Heavy plates are very strong and large premiums are being paid for fire box material. The sheet market shows some irregularity, especially in blue annealed prices.

THE OPEN HEARTH

The Steel Bar Market

FOR many years, an extremely interesting and important feature of the finished material market has been the selling of steel bars to the agricultural implement manufacturers. These manufacturers use annually from 250,000 to 300,000 tons of soft steel bars and a much smaller tonnage of hard steel bars. Interest has not centered in these transactions owing to the tonnage, for other consumers have bought larger amounts, but because of the fact that the agricultural implement manufacturers have usually acted in greater harmony than many other buyers and have persistently presented arguments of an unusual character to show that they should be granted long contracts and special concessions.

One of the strongest arguments of these agricultural implement makers has been that in order to issue their catalogs in time to meet the demand of the farmers, it is necessary for them to know how much their bars will cost long in advance and to contract for a 12-month period. For years the mills allowed the agricultural people to contract for a year, beginning with July. A new policy was inaugurated this year when contracts were limited to a six-month period beginning July 1, 1916, and this policy was continued when it was announced that contracts would be made for six months beginning Jan. 1, 1917, at 2.50c, Pittsburgh, or $50 per ton.

As a result of the united and persistent efforts of these buyers, price concessions have been more freely made than to other buyers, and in some cases bars have been sold at or below cost. This policy has been continued even when prices of farm products have been advancing and farmers have been very prosperous. In one year, owing partly to the active foreign demand for many iron and steel products, steel bars have advanced fully 100 per cent, or to $50 per ton on contracts and premiums have been paid for prompt delivery. The agricultural implement manufacturers, like many other domestic consumers whose business has not increased as that of manufacturers who have catered to the foreign trade, have resisted paying the higher prices and there was some plausibility to their argument. The farmer, with his natural tendency to resist paying higher prices for his implements, often refused to do so, and at the same time, many thousands of farmers have purchased automobiles. The manufacturers finding the farmer obsessed with ideas in opposition to higher prices and by the determination to buy automobiles, brought strong pressure to bear on the steel manufacturers. Nearly all companies positively declined to make any concessions, but on Wednesday, July 12, *The Iron Trade Review* and other trade and newspaper representatives were informed by a very high authority in the steel business that sales of steel bars, amounting to 80,000 tons, had been made at 2.35c, Pittsburgh. This positive statement was published and was followed by a storm of protests and denials, the secretary of the National Implement and Vehicle Association and other representatives of the agricultural implement industry denying that any purchases had been made or would be made at 2.35c, while representatives of numerous steel companies positively declared that no sales had been made at less than 2.50c, Pittsburgh. Finally, after a lapse of three weeks, the authority which made the statement on July 12 that the 2.35c price had been granted, issued the explanation that this was an error, that nothing less than 2.50c had been made to the agricultural implement trade and that effective Aug. 2, the quotation to the general trade had been advanced to 2.60c.

In justice to itself, *The Iron Trade Review* makes the above plain statement. It is in the business of publishing news about the markets for iron and steel products and realizes its fallibility. This paper makes mistakes, and when it does so, is willing to admit it, but it realizes that in this fallibility it is like all mankind, and in this particular case, it did not make any mistake. The news as published was the mere repetition of a positive statement, and if *The Iron Trade Review* should refuse to publish news of such character, bearing every evidence of being absolutely reliable, the market pages might as well be left absolutely blank.

The Iron Trade Review does not question the motives of anybody, but it believes it has been absolutely right in this matter and has no retraction to make.

Plan to Abolish "Pork"

CONGRESSMAN JAMES, of Michigan, as related in our Washington correspondence in this issue, has devised a very simple and admirable method of eliminating "pork" from appropriation bills. He would merely authorize the President to veto items of such bills.

Mr. James' joint resolution should be adopted in the interest of orderly business methods and sound public policy. It would place squarely on the President the tremendous responsibility of vetoing obnoxious and unnecessary items in the various appropriation bills without completely destroying the measures providing for the operating expenses of the government. It would give him the privilege of exercising discrimination as to what is in an appropriation

THE OPEN HEARTH

measure. If he failed to use such discrimination, then blame would rest directly upon him. It would be a duty calling for courage in the chief executive, but most of our presidents have been men of courage. At present the veto is in too many cases a useless perogative; use of it may destroy much of good in order to prevent some measure of bad; and, on the other hand, failure to employ it must give appearance of approval to everything bad in a bill that is signed.

In nearly all the states, the governor has the power to disapprove any item or items of any appropriation bill. The items disapproved are void unless repassed according to the rules and limitations prescribed for the passage of other bills over the executive veto. Under the laws of the United States, the President has no such power. If there is any "grab" or "rider" in an appropriation, the only way to get rid of it is to veto the entire appropriation bill, halting the orderly process of the government. The James resolution would confer upon the President such power with regard to vetoing items in national appropriation bills as is conferred upon governors in most of the states as to state appropriation measures. If the James resolution became a law, no President hereafter could hide behind the present limitations on his veto power, and give way to political expediency on the ground that he must veto all or none. For example if such a law were now on the statutes, President Wilson would be forced to go openly on record as to whether he would or would not veto the Tavenner rider in appropriations bills recently passed. This rider, as is well known, was sponsored by organized labor, and prohibits scientific shop management in government plants.

Excellent as the James plan is, it is certain that its passage will not be brought about unless business interests and the public generally are aroused to a point where they will bring sufficient pressure on congress to pass the resolution. The evil influence against any such legislation is tremendous, but that of the business men, if effectively used, would be much more powerful. Will it be so used?

War, the Great Steel Consumer

ANOTHER buying movement in munitions by European governments, now apparently at its height, differs in a number of important respects from its predecessors. Contracts now being placed are confined almost exclusively to the large-sized and high-explosive types of shells and shell forgings, ranging from 6 to 12-inch. Very little of the smaller and shrapnel types, which were ordered so freely from this country earlier in the war, now are included. There are at least two important reasons for this change. One is that the mobilization of industrial plants for the needs of war by the various belligerents has put them in a more independent position on these needs. Furthermore it appears there is an ample supply of raw material in hand or being produced at home, to cover them. The principal reason, however, seems to be that first decisions of the allies as to the necessities for breaking the lines of a determined and well-equipped enemy have undergone considerable revision. Great or destructive power is called for by the strength of modern trench works.

Another phase of the present buying is that only a limited number of munition makers are being given renewals of contracts. Those who have proved their capacity to meet intricate specifications and required deliveries on previous orders, are being so favored. Many of these manufacturers had not previously produced such large shells as they now have undertaken. As a result, they are obliged to again re-equip their plants in some particulars and the machinery market now reflects this fact by the increased buying of large capacity lathes. The present contracting in munitions, being more limited as to sizes and as to the number of manufacturers, promises to be somewhat less in volume than in the previous movements. The degree of specialization, however, will be increased.

The more one studies the war commerce between European countries and the United States, the stronger becomes the impression that it is the shortage of steel with the former that is at the root of much of the buying of munitions on this side. Germany and her allies, according to all statistical authority, still hold by a wide margin the upper hand over their foes in iron and steel capacity. Without the United States to draw upon for the basic metal of warfare to supplement their own inferior output, England and her allies unquestionably could not carry their operations on the scale now adopted. The steel being here, as well as tremendous mechancial capacity for shaping it to the needs of war, it would seem to be good strategy that a certain proportion of it at least should be finished in this country, thereby maintaining a constant source of great reserve power. Manifestly it is to the advantage of the allies to keep a certain amount of munition capacity in this country keyed to a high state of efficiency.

As the relative strength in iron and steel resources of the opposing groups of nations now stands, there is sound reason to expect that liberal buying of the wares of war in this country will continue indefinitely, perhaps to the conclusion of peace.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products August 9, average for July, 1916, average for May, 1916, and average for August, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Aug. 9, 1916.	Aver. for July, 1916.	Average for May, 1916.	Aver. for Aug., 1915.
Bessemer pig iron, Pittsburgh	$21.95	$21.95	$21.95	$15.89
Basic pig iron, Pittsburgh	18.95	18.95	18.95	14.89
No. 2 Fdy. pig iron, Pittsburgh	19.45	19.45	19.325	14.70
Northern No. 2 Fdy., Chgo.	19.00	19.00	19.00	13.40
Lake Superior Charcoal, Chgo.	19.75	19.75	19.75	15.75
Mall. Bess., Chgo.	19.50	19.50	19.50	13.40
Southern No. 2, Birmingham	13.50	14.00	14.95	11.00
Southern Ohio No. 2, Ironton	18.50	18.38	18.46	13.63
Basic, eastern Pa.	19.00	19.25	20.50	15.25
No. 2X Virginia furnace	18.50	18.50	18.50	13.00
No. 2X foundry, Philadelphia	20.00	20.00	20.75	15.25
Ferro mang., Balti.	170.00	175.00	175.00	105.00
Bessemer billets, Pbgh.	43.00	40.00	44.25	23.00
Bess. sheet bars, Pbgh.	43.00	40.00	44.25	24.00
Op.-h'th sh. bars, Pbgh.	43.00	40.00	44.25	25.00
Open-hearth billets, Pbgh.	43.00	40.00	44.25	24.00
Steel bars, Chgo.	3.10	2.69	2.69	1.49
Steel bars, Pittsburgh, contr.	2.60	2.50	2.50	1.30
Iron bars, Philadelphia	2.559	2.559	2.559	1.40
Iron bars, Cleveland, local del'y.	2.40	2.40	2.40	1.22
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.23
Beams, Chgo.	3.10	2.69	2.69	1.49
Beams, Pittsburgh, contr.	2.60	2.50	2.50	1.30
Beams, Philadelphia	2.659	2.659	2.659	1.45
Tank plates, Pbgh., contract	3.00	2.86	2.75	1.30
Tank plates, Chicago	3.50	3.09	3.09	1.44
Tank plates, Philadelphia	3.909	3.909	3.909	1.45
Sheets, blk., No. 28, Pbgh.	2.90	2.90	2.925	1.83
Sheets, blue an., No. 10, Pbgh.	3.00	3.00	3.02	1.36
Sheets, galv., No. 28, Pbgh.	4.25	4.37	4.88	3.93
Wire nails, Pittsburgh	2.60	2.50	2.50	1.61
Connellsville fur. coke, contr.	2.40	2.42	2.60	1.75
Connellsville fdy. coke, contr.	3.15	3.15	3.50	2.25
Heavy melting steel, Pbgh.	16.00	16.25	17.125	13.38
Heavy melting steel, east'n Pa.	15.00	15.25	17.00	13.50
Heavy melting steel, Chgo.	14.25	14.15	16.50	11.50
No. 1 wrought eastern Pa.	19.75	19.75	22.75	15.00
No. 1 wrought, Chgo.	15.25	14.00	16.35	10.12
Rerolling rails, Chgo.	15.50	15.70	17.25	11.75
Car wheels, Chgo.	12.00	12.25	13.15	11.40

(For Additional Prices See Page 298a.)

More Activity in Pig Develops

Several Round Tonnages of Basic Bought by Eastern Ohio and Western Pennsylvania Melters—More Interest in Foundry Grades in Central West

Pittsburgh, Aug. 8.—Eastern Ohio and western Pennsylvania melters have taken about 20,000 tons of basic pig iron for delivery the remainder of this year and the first quarter of 1917. One consumer has purchased 10,000 tons of basic iron for shipment the remainder of this year; another has taken 5,000 tons for fourth quarter delivery, and a 5,000-ton lot has been sold for shipment the first three months of next year. All the iron involved was purchased at $18, valley. Dealers express the belief that they will be able to obtain $18.25, valley, for the greater part of the basic iron shipped the first quarter of next year.

Bessemer pig iron continues to be quoted at $21, valley. Demand for export is heavy, but no sales of importance have been made in the open market the last week or 10 days. Fairly heavy demand exists for foundry iron for shipment next year, but dealers do not appear anxious to sell for shipment after Dec. 31, next. One blast furnace interest is asking $19, valley, for delivery next year. It is understood that 1,200 tons of No. 2 foundry iron has been sold at $18.50 for shipment the early part of 1917. Another sale of 2,000 tons of malleable iron for shipment next year, is noted.

Cherry Valley furnace of the United Iron & Steel Co., Cleveland, at Leetonia, O., operating on foundry iron, was blown out Saturday for relining; it will be a month or six weeks before the stack is ready for the torch.

Strong Demand for Export

Chicago, Aug. 8. — Numerous indications are appearing which lead to the belief on the part of many observers that the pig iron market is about to gain strength. It is even believed that before the end of the year an actual scarcity of iron will prevail in this territory.

One matter leading to this belief is the strong demand for steel-making iron for export. Apparently eastern makers have been unable to satisfy this demand, and buyers are working with western furnaces to obtain tonnages, especially of bessemer. One western furnace has already taken some of this business, and tentative plans are being made toward putting another western stack on this grade.

Another factor which will limit the quantity of iron available for domestic users is the probability that at least one, and perhaps two stacks will have to blow out for relining within a short time. Sales are being made cautiously in view of this condition. These indications come on top of the fact that western furnaces are already well sold for last half, and it appears likely that sales of 80,000 to 100,000 tons additional would practically take up the entire slack in the market and make it impossible to obtain further iron.

Domestic users are not anxious about their future requirements, and inquiry is for small tonnages. Most inquiries result in sales, as the iron is needed for immediate melting. The largest sale made recently is believed to be represented by 1,500 tons of charcoal iron. Prices remain steady at $19 for Northern No. 2 foundry, and $19.50, furnace, for malleable.

Some better indications are seen in the southern market, although inquiry and sales amount to practically nothing in this territory. Prices show no change, most makers asking $14, Birmingham, for this year's delivery, and $15, Birmingham, for first half.

Most of the resale iron which has made the market sluggish seems to have been sold, and has gone to consumers, which has taken it off the market entirely. One interest in the Birmingham district has turned one of its largest stacks to making basic iron, and is planning to put a second on the same grade. A third stack is about to go out for relining, and with these three out of the foundry market, the situation should strengthen considerably. Another south-

(*For complete prices see page 298.*)

ern interest finds itself oversold and falling behind on deliveries.

An interesting situation seems likely to result from these conditions north and south, and the remainder of the present year is expected to yield some excitement.

Pump Company in Market

New York, Aug. 8.—A combined inquiry aggregating 17,000 to 18,000 tons, mainly of foundry and charcoal with a small amount of bessemer and low phosphorus iron, has been put out by the International Steam Pump Co. for its various plants for delivery over the first half of next year. This is the largest domestic inquiry that has reached the market in months. Prices are asked on 6,400 tons for Harrison, N. J.; 5,250 tons for Buffalo; 2,750 tons for East Cambridge, Mass.; 1,550 tons for Elmwood Place, O.; 1,125 tons for Cudahy, Wis., and 900 tons for Holyoke, Mass. As the buyer practically is asking for an option since he provides that the prices are to be left open indefinitely, some makers will not quote for this business. Another buyer in this district has been figuring on 3,000 tons of high phosphorus foundry. Generally, however, the domestic market has not improved and is very slow. Prices are indefinite. Further good-sized sales of iron for export are being made and the new inquiry keeps to a heavy total. Among the sales of the week were 1,000 tons of bessemer and 2,000 tons of Alabama foundry to Italy. Additional export sales of bessemer have been made at $22.50, tidewater, against $23 and $23.14, recently, the latter price at New York representing $21, valley. An inquiry for 10,000 tons of low phosphorus, thought to be for Russia, is in the market. France has asked for quotations on several lots of 500 to 2,000 tons each of low phosphorus. Spain wants 1,500 tons of foundry, 600 tons of hematite and 1,000 tons of foundry coke. There are numerous other inquiries. Freights again are inclined upward, and $35 per ton was quoted this week from the north Atlantic to Mediterranean ports against $33 to $33.60 and lower recently. This appears to be checking buying in some degree.

Improvement at Cleveland

Cleveland, Aug. 8.—There is a distinctly better feeling in the pig iron market and a fair amount of buying is being done. One Cleveland foundry has purchased several thousand tons for delivery beginning in October and extending into next year. A number of foundries have either bought moderate tonnages or are in the market. An interesting fact is that a considerable part of this buying is for the remainder of this year, showing that foundries have not covered fully for their requirements up to Jan. 1. It is evident that in some cases the foundries have been able to increase their melt on account of obtaining more molders or settling strikes that have been pending for a number of weeks.

The Canal Dover furnace of the Penn Iron & Coal Co. will be blown out in a few days and will be rebuilt. Its capacity will be increased about 30 per cent, or to about 15,000 tons per month. The stack will have a thin lining.

Moderate Improvement.

Philadelphia, Aug. 7.—From a general market standpoint, pig iron conditions in this territory reveal a slight improvement. The volume of new business has been larger, but remains of very modest extent and the change in orders booked is scarcely significant of an awakening of buying interest. Sales invariably are small and they leave much to be determined as to the exact state of prices, which appear soft and susceptible of shading, especially in foundry grades. Many buyers continue to hold up shipments because of labor shortages. As an offset, some furnaces which were slated to go in have been held back indefinitely because of the lack of working forces. The humid weather continues to affect the operations of the furnaces. Certain eastern Pennsylvania steelmakers have continued to sound out the forward basic market, one for first half, but the higher prices asked by makers have deterred purchases. In some cases, sharp advances were asked for first half. Some speculative valley basic which has been held in this district has been resold to consumers in Pittsburgh territory, including one lot of 6,000 tons, at about 25 cents under the market. An eastern Pennsylvania iron mill bought about 1,000 tons of standard forge, some of which brought $18.50, delivered. A Delaware river pipe foundry closed for an additional 1,000 tons of pipe forge at about $18, delivered eastern Pennsylvania. No. 2X foundry is obtainable readily at $19, furnace, and this probably could be shaded. Reports of lower prices regarding Virginia iron are to be heard. A sale of 1,500 tons of nickel-chrome iron by an eastern Pennsylvania maker was closed at $38, furnace. Low phosphorus makers have numerous export inquiries before them, including a new one for 10,000 tons, but avoid taking further business for this year because of their heavy order book.

Market Tone Improves

Buffalo, Aug. 8.—The furnace interests report that a better feeling is creeping into the market from practically all directions. There has been considerable inquiry for iron for export, but the stacks of the district are sold up to such an extent that no effort was made in this territory to book some of the overseas business.

Prices remain as previously quoted at $18 to $19 for the various grades of foundry and malleable irons, and there is every indication that whatever tonnage there will be available to sell for delivery over the remainder of the year will be placed at a full and satisfactory figure to the producing interests.

Iron under contract is being ordered out to the limit of the capacity of the going stacks and yard stocks are disappearing as well. With the current rate of consumption continuing into 1917, and with no stocks to fall back upon, it is evident that the first half sales are more than likely to be on an upward market.

Offers Iron Lower

Cincinnati, Aug. 8. — The price of southern iron continues weak. One Tennessee stack is now offering No. 2 foundry iron at $13.50, Birmingham basis, for last half of this year and the first half of next year. Scattering lots of resale iron are also obtainable around $13.50, Birmingham basis. The majority of furnaces are holding from $14 to $14.50, Birmingham basis, for any delivery until June, 1917. Southern Ohio iron is stronger proportionately than southern iron, because furnaces in the former district are well booked on basic iron. The only inquiries in the market are for 3,000 tons of malleable iron from a northern Ohio user for first half delivery, and 15,000 tons of foundry iron from the International Steam Pump Co., for last half and first half shipment, for its various plants, 2,000 tons of which will go to the Laidlaw-Dunn-Gordon Co., of this city, a subsidiary.

The stack of the Wellston Steel & Iron Co., Wellston, O., has been blown in on Bessemer iron, and will make 175 to 200 tons per day of this grade.

Dull in the South

Birmingham, Ala., Aug. 7.—The pig iron market in the Birmingham district for the past week has been characterized by an exceedingly dull tone. The actual transactions were very small in foundry iron. One

(*For complete prices see page 298.*)

sale of 2,000 tons of basic at $15.50 per ton at the furnace was made. Production of iron is continuing at a high rate. Last month's figures totalled 213,883 tons against 204,389 in June—a gain of 9,494 tons. While July contained an additional working day over June, yet the production would have gone even higher in July had not the heavy rains and floods been encountered. It is a fact that very little iron is yet being piled on the yards. One furnace reports that it has not only been able to ship every pound from the block, but has gradually shipped from the yard. The base price of $15 per ton, Birmingham, by Birmingham district producers is being maintained. One large interest is asking $15 for prompt shipment and $15.50 for the rest of the year, though small sales are being made on such a basis.

By the end of the month, one additional stack will have been blown in at Gadsden, Ala., by the Alabama Co. The torch was applied last week for drying the lining. The Woodstock furnace at Anniston will also probably go in by Sept. 1. Heavy shipments are being made on export orders taken some time ago. The Anniston Ordnance Co., at Anniston, Ala., is shipping from three to five cars of shells per week.

Steel Line Pipe

Is Sold in Large Tonnages for California and West Virginia

Pittsburgh, Aug. 8.—Heavy tonnages of steel line pipe for shipment to the central west and west have been sold this week. A California oil and gas interest has placed contracts for 450 miles of 10-inch line pipe, involving about 50,000 tons, which will be furnished, it is understood, by mills in the Youngstown district. The Columbia Gas & Electric Co. has purchased 45 miles of 20-inch pipe, involving 7,800 tons for shipment to West Virginia and the Philadelphia Co. has taken 15 miles of 16-inch pipe, involving 1,500 tons, for delivery to West Virginia points. Demand for oil country goods is decidedly heavy, but the market for merchant pipe continues rather quiet. Specifications for boiler tubes and seamless tubes are very heavy and premium prices are being paid for both products. Manufacturers believe that demand for merchant pipe will improve shortly.

The William Tod Co., Youngstown, has been granted a temporary injunction against certain of its former employes now on a strike, who have been restrained from interfering with employes of the company.

Ore Movement

Is Very Lively and Very Little is Being Placed on Docks

Cleveland, Aug. 8.—The movement of iron ore from upper lake ports is going forward so rapidly that it is predicted in some quarters that the movement for the month will be very nearly 10,000,000 tons, unless a strike on ore docks or vessels occurs. Although 9,752,624 tons were shipped in July, the tonnage remaining on lower lake docks on Aug. 1 was only 4,810,671 tons, compared with 6,539,933 tons on Aug. 1, 1915, these figures showing that a very large percentage of the ore is going direct to the furnaces.

The Lake Carriers' Association has advanced wages $10.00 per month for all men under the grade of licensed officers. This is the second wage advance to be made this year, the other having been an advance of 10 per cent announced at the opening of navigation. This advance has relieved to a large extent the fear of a strike on the part of lake sailors, but there is still possibility of trouble.

The coal dock strike at Superior has caused much annoyance. The men have rejected the compromise offer of $3.00 for a 10-hour day and are demanding $3.25. The present wage is $2.85. Industrial Workers of the World who have caused so much trouble recently at Mesabi mines, are now active in the strike at Superior. So far only a few boats have been interfered with by the strike.

Out of a total movement of 9,750,157 tons of iron ore shipped during July 7,681,084 tons were received at Lake Erie ports, including Detroit, distributed as follows:

Port.	1916.	1915.	1914.
Buffalo	1,174,378	812,041	471,724
Erie	194,616	85,667	37,863
Conneaut	1,437,320	1,434,386	1,130,829
Ashtabula	1,696,622	1,371,531	1,063,381
Fairport	401,097	369,298	296,833
Cleveland	1,657,510	1,241,132	1,011,372
Lorain	610,967	603,880	211,727
Huron	167,940	110,013	133,016
Toledo	309,509	106,602	102,628
Detroit	31,125	27,180	9,415
Total	7,681,084	6,161,730	4,468,788

The total ore on dock Aug. 1 was 4,810,671 tons, compared with 6,539,933 tons on Aug. 1, 1915. Shipments from lower lake ports to furnaces during the month amounted to 5,289,590 tons.

Receipts at South Chicago during July were 1,097,484 tons and at Gary, Ind., 312,773 tons.

Will Retire.—The Farist Steel Co., Bridgeport, Conn., whose plant was destroyed by fire last winter will probably sell its property and retire from business after an existence of 44 years. It owns nearly nine acres of land, dock facilities and an extensive water front. George Windsor, secretary and treasurer of the company says that little hope remains for rebuilding or removal elsewhere.

(For complete prices see page 298.)

Ferro for Export

Causes Some Inquiry—Domestic Users Are Well Covered

New York, Aug. 8.—A moderate amount of spot inquiry for ferro-manganese is in the market and the larger portion of this is for export. Italy is the principal buyer and has been closing for various lots. Domestic users are well covered and show little interest in new purchases except small amounts for filling-in needs. The heavier deliveries of English ferro-manganese recently have helped the apparent easiness of the market. Talk of lower prices obtainable is current, but reliable information is lacking to show that less than $170, seaboard, or furnace, has been done. The market may be quoted at from $170 to $175. On a 10-ton lot to the government, as high as $185 was named.

There is some export inquiry for spiegeleisen, including two lots of 500 tons each for Italy, but very little new domestic business. Prices remain at $45 to $50, furnace, for 20 per cent.

Alloys Quiet at Pittsburgh

Pittsburgh, Aug. 8.—Ferro-manganese and other alloys are comparatively quiet and prices are not so high as they were a few weeks ago. For prompt and future delivery, ferro-manganese recently has been offered at from $170 to $175, seaboard. Some irregularity is reflected by the market for lower grades of ferro-silicon. It is reported that 10 per cent material has been offered at $30 a ton at the furnace. Fairly heavy demand exists.

Virginia Manganese Ore

New York, Aug. 8.—Recent reopening of Virginia manganese ore mines is bringing about considerable offering and marketing of this mineral. Known sales of the week have run from 25 to 30 cars. Some of this ore, which was on track, is understood to have been sold to the Steel Corporation at its standing schedule of 45 cents, Pittsburgh, for 48 per cent ore. As a rule, the miners are not willing to accept the Steel Corporation's offers, as considerably more is obtainable from others consumers. In fact, some sales of Virginia ore have been made at close to the nominal market on Indian ore, which at present is regarded at around 60 cents per unit at tidewater.

Tank Plates Very Strong

With Deliveries Far Delayed—Demand for Plates for Shipbuilding and for Export is Very Active

Philadelphia, Aug. 7.—Much strength continues to be shown in plates, as the demand is very heavy, but the market displays some curious contrasts. Large makers have been quoting 2.90c, Pittsburgh, on first half contracts, and certain eastern makers have accepted business at that figure. The minimum price of the market now has been raised to 3c, Pittsburgh. Other eastern mills have had little trouble to obtain 3.75c and even 4c, Pittsburgh, on tank and structural plates, but on universals, where rather early shipments are possible, 3.50c, Pittsburgh, has been quoted. Disc and flanged plates also are obtainable easily. One foreign buyer has offered eastern mills 3.75c, mill, for 10,000 tons for 12 months' delivery, while another dealer who received a much lower quotation for first half for export reported the business could not be secured unless the price was made to apply to early delivery. Generally speaking, tank quality cannot be had for many months. One eastern maker reports its schedule now is full for nine to 10 months. Some further contracts for specification during the last quarter of this year have been placed by domestic buyers at 4c, Pittsburgh. A shipbuilder is inquiring for material for three boats, about 6,000 tons. The purchases of Gloucester, N. J., and Wilmington, Del., shipyards, which inquired for 20,000 tons, now are understood to amount to 12,000 tons, divided between two eastern mills. The Pennsylvania railroad still holds up action on a recent inquiry for about 5,000 tons. A recent Japanese inquiry for 28,000 tons of plates is reported to have been closed with a steel export house. Another more recent Japanese inquiry called for 10,000 tons. There were not many cancelations of unspecified contract tonnage at the end of July and buyers were allowed some extension of time to draw out the remainder of high priced monthly lots.

Plates are Advanced

Chicago, Aug. 8.—Steel plates were given an advance of $2 per ton late last week by all makers, making the quotation at present 3.19c, Chicago mill. This price went into effect Aug. 4. Demand for steel plates, largely for ship building, continues unusually strong, and a sale of more than 10,000 tons for shipment to the Pacific coast is illustrative of the necessities of ship builders. On this business, it is understood, some small tonnages are to be furnished during the last quarter of this year, and most of the plates during the first half of next year.

Specifications Heavy

Pittsburgh, Aug. 8.—Effective Aug. 5, the Carnegie Steel Co. advanced its price of steel plates $2 a ton, from 2.90c to 3c and that figure has been adopted by manufacturers in the central west for delivery at their convenience. The Carnegie company and the Jones & Laughlin Steel Co. say that 3c is the absolute minimum price of steel plates. Some mills had been asking 3c for plates for several weeks. For rather prompt delivery, one mill is selling at a range from 3.50c to 4c.

Specifications for plates are heavy, but new demand is comparatively light. No important orders for steel cars have been placed in this district recently. People in close touch with the situation, however, predict that an actual shortage of cars will exist shortly. Railroads now are getting ready for the movement of crops. Several railroads continue to figure in the market for equipment. The Minneapolis & St. Louis railroad is negotiating for 500 box cars; the Delaware & Hudson, 500 hoppers; the Nickel Plate, 1,000 freight cars and the Northern Pacific, 300 automobile cars. Eastern ship yards continue to figure in the market for about 50,000 tons of ship material.

Light Plates Active

Cleveland, Aug. 8.—Cleveland mills rolling light plates are becoming exceedingly busy and quotations on ordinary business vary from 3.25c to 3.50c, but on small tonnages higher prices are named. Premiums are freely paid on firebox material for prompt delivery and in some cases the price has been as high as 4.50c, not including extras. Universal plates are now being sold by eastern mills for delivery in from three to four weeks at 3.50c, mills.

The Spencer Wire Co., Worcester and Spencer, Mass., which paid its first year's bonus this month, has decided to increase the dividend from 6 to 8 per cent and to make the payments quarterly instead of annually. The first distribution amounted to about $30,000. Under the new system, the first payment will be made Oct. 1 to all employes in the service of the company from July 1, 1916. For less than three months' service no dividend will be paid. Any funds forfeited by men who are discharged or leave the company during the year, will not be lost, as the company will lay aside this money to provide a benefit fund, which will be used to give assistance to aged or disabled employes.

(*For complete prices see page 298.*)

Coke Shipments

Are Irregular — Men Refuse to Work Owing to Hot Weather

Pittsburgh, Aug. 8.—Cokemakers are experiencing difficulty in operating plants at desired capacity. Many laborers in the Connellsville regions have refused to work, on account of the hot weather. Shipments have been irregular and uncertain, but no scarcity of coke has been reported. Small lots of blast furnace fuel for spot delivery have been sold at a range from $2.65 to $2.75, ovens. Some rejected coke has been offered at $2.50, ovens. The contract market and the market for foundry coke is unchanged in position. *The Connellsville Courier* says production the week ending July 22, was 413,280 tons, compared with 418,016 tons the week before.

Slow at Cincinnati.

Cincinnati, Aug. 8.—From all appearances, both furnaces and foundries are well stocked with supplies of coke, as neither can be interested in occasional special lots that appear upon the market at attractive prices. Demand for spot furnace fuel has fallen away to almost nothing. It is very evident that southern ovens are in a position to ship more coke than contracts call for. A let-up in demand for furnace coke is very noticeable, but dealers can not ascertain any cause. Prices are unchanged on all grades of Wise county, Pocahontas and New River coke.

More Ovens Active.

Birmingham, Ala., Aug. 7.—An additional battery of 100 bee-hive coke ovens was put in commission during the past week by one of the furnace interests. These are leased commercial ovens and were obtained to supplement the furnace company's coke supply. One commercial coke operator sold 500 tons of coke the past week for shipment over the next two months, and another company sold 750 tons. Several hundred tons of hand-picked foundry coke were also sold. Prices are firm at $3 to $3.50 per ton at the ovens for furnace coke and $4.25 to $4.50 per ton at the ovens for foundry coke.

Bar Advance Stimulating

Is Followed by Heavy Specifying and by Greater Interest in Forward Contracts—All Mills Hold to 2.60c, Pittsburgh

Philadelphia, Aug. 7.—The advance of $2 a ton in the price of steel bars last week has had the effect of stimulating considerable interest among buyers on forward contracts. Many of these buyers, following the announcement of the advance, came into the market and sought to close contracts at the old basis of 2.50c, Pittsburgh, which the makers declined to do. New business at the latest price is lacking. Some light inquiries for 3½ and 5½-inch rounds, apparently for munition purposes, have been asked for by users in this territory. Makers are saying they would want 3.75c to 4.00c, Pittsburgh, for large rounds under present conditions. Specifications against contract quotas for July from consumers in this territory were disappointingly light and there were some cancellations of tonnage not taken out. It is evident, however, that the mills are following a more liberal policy, since prices are so high, on the matter of buyers ordering out promptly their monthly quotas, and in some cases extensions of time have been allowed before cancellations. All the mills now are holding steel bars at 2.60c, Pittsburgh, or 2.759c, Philadelphia, for forward contracts. The Pennsylvania and Norfolk & Western railroads continue in the market for fair tonnages. One of the bar mills of the remodeled plant of the Wilmington Steel Co., Wilmington, Del., now is in operation.

Steel Bars Strong

Chicago, Aug. 8.—An advance of $2 per ton on steel bars by the leading interest and independents during the past week is an indication of the strength in the bar market. This is believed to have come about through the pressure of export business, and the apparent reluctance of domestic consumers to cover their requirements for first half of next year.

Some agricultural implement manufacturers, not the larger users, have covered their first half requirements at 2.69c, Chicago mill, and other tonnages are under negotiation at present. The buyers who have closed took about the usual tonnage required by their operations. Their willingness to buy at present prices appears to have come about through the advance made last week, which apparently indicated to them that higher, rather than lower prices, would rule.

Hard steel bars continue quotable at 2.50c, Chicago mill, with premiums on some of the lighter sizes which are most in demand. These sections are being booked at 2.75c to 3c, Chicago mill, but this business is not heavy. Most hard steel bars are being taken for reinforced concrete, but some specifications are being received from agricultural implement makers who have not been specifying recently for this class of material. Bars going for this purpose are not in excess of usual demand. No contracts have yet been made for hard bars for delivery next year.

Steel Bars Firm at 2.60c

Pittsburgh, Aug. 8.—All manufacturers of steel bars in the Greater Pittsburgh district now are asking 2.60c as a minimum for delivery at their convenience. As reported in last week's issue of *The Iron Trade Review*, that figure was adopted Aug. 1, by the Carnegie Steel Co. The advance in price not only tended to quash reports about concessions to agricultural implement makers, but acted as a market stimulant. Most mills have enough tonnage on their books to maintatin present rates of operation well into 1917. Iron bars continue to be offered at 2.65c. Specifications are fairly heavy, but new demand is light.

Pressure for Deliveries

Cleveland, Aug. 8.—Following the announcement last week of an advance in bars to 2.60c, Pittsburgh, and the probable advances in other products, specifications came in in increased volume and the presure for deliveries became very strong. Specifications are now being received with clock-like regularity, and all requests to have tonnages for the present quarter extended into the next quarter will be refused.

Would Like to Contract

New York, Aug. 8.—Following the announcement of the advance of steel bars to 2.60c, Pittsburgh, a price now being quoted by all the leading makers, a number of large buyers in this and other districts have been besieging makers offering to contract for first half of 1917 at 2.50c, Pittsburgh. These buyers have included some of the largest of the manufacturing trade and it is noteworthy that these consumers only a week or more ago showed absolutely no interest in contracts at the then official quotation of 2.50c, Pittsburgh. It is not known definitely whether these belated efforts to contract at 2.50c were successful, but the indications are that certain mills accommodated preferred customers in this manner. It is certain, however, that some bar producers declined to make any concessions from the new price of 2.60c, Pittsburgh.

Bar Iron Steady

Chicago, Aug. 8.—While most makers of bar iron in the Chicago district are well sold for their entire production through last half, one maker, who has not contracted for more than 60 days in advance, still has considerable tonnage to dispose of for this year's delivery. New business and specifications are being received in sufficient volume to insure steady operations, and present business is being taken on a basis of 2.35c, Chicago mill. The effort some weeks ago to fix the price of 2.50c, Chicago mill, did not succeed, and this quotation apparently has disappeared. Such business as is being taken for delivery during the fourth quarter is subject to specifications during third quarter.

Hoops and Bands

Pittsburgh, Aug. 8.—Steel bands now are being held at 2.60c, the price of steel bars, by manufacturers in the Greater Pittsburgh district. It is likely that the 2.50c figure will disappear entirely before Aug. 15. Steel hoops are being quoted at 3c, but the 2.75c price has not been withdrawn in all instances for delivery at the convenience of the mill.

Shafting

Pittsburgh, Aug. 8.—Manufacturers are asking from 15 to 20 per cent off the list for cold rolled steel shafting for shipment at their convenience. The recent advance in the price of steel bars has tended to strengthen the market all along the line and shafting manufacturers may withdraw quotations below 15 per cent off the list, at an early date.

Will Roll Bars

Birmingham, Ala., Aug. 7.—The Anniston Ordnance Co., Anniston, Ala., has completed repairs on one of the rolling mills at the old car works, and work is being pushed on two additional ones. It is the purpose of the company to get in readiness for rolling the output of the steel from the electric furnaces at that point which have been installed. Light bars at first will be rolled and gradually worked into heavier sections.

(*For complete prices see page 298.*)

Some Shapes Are Cancelled

When Specifications Are Not Promptly Filed—Mills Glad to be Relieved of This Tonnage, as Obligations Are Heavy

New York, Aug. 8.—Certain eastern mills are following the Steel Corporation's lead in holding shapes at a minimum of 2.60c, Pittsburgh, but others have been quoting this figure or more for some weeks. It is thought that the 2.50c, Pittsburgh, or 2.669c, New York, price, however, has not entirely disappeared, and is not likely to for several weeks. It is known that some good-sized fabricated jobs commanding a premium because of the early deliveries promised, were closed this week on a 2.50c, plain material, base. New structural enterprises now going ahead are not numerous. Many prospective builders are undecided whether to proceed at this time or take the chance of obtaining lower prices later. A number of apartment house jobs in this city remain of this class and they usually do not develop beyond the bidding stage. A 2,000-ton inquiry for a sugar mill in Haiti is active.

Few Contract Cancellations

Philadelphia, Aug. 7.—Eastern makers of structural shapes have canceled some tonnage which had not been specified in July as per the contract schedule. This was not a large amount, however, and with some makers it is estimated at from 5 to 10 per cent. Some of the larger buyers were allowed extensions on remainders of July quotas, and the general attitude of makers is to allow buyers greater latitude in specifying, now that contract prices are on the highest level. Such cancelations as were made were helpful to the mills, as their obligations remain very heavy and hot weather has so cut down production that in July it was only 60 per cent of expectations with certain works. Prices appear firmer and the Steel Corporation now has advanced $2 a ton to 2.60c, Pittsburgh. Eastern mills have made recent sales for forward delivery at their convenience at 2.70c, Pittsburgh, and some makers are quoting 2.75c, Pittsburgh on future contracts. Representatives of the government have been sounding the mills as to the quickest deliveries possible on 4,000 tons for navy yard extensions in preparation for the large program of warship construction.

Structural Shapes Up $2

Pittsburgh, Aug. 8. — In consonance with the advance of $2 in the price of steel bars, effective Aug. 1, manufacturers of structural shapes on Aug. 5, put up the price $2 a ton to 2.60c and that figure now is being quoted as a minimum by the Carnegie Steel Co., the Jones & Laughlin Co. and other manufacturers in this district. Steel bars and structural shapes had been selling at 2.50c since last March. Specifications against contracts for structural shapes are fairly heavy, but new buying is comparatively light. It is believed, however, that the advance in prices will tend to stimulate activity.

Advance Shapes $2

Chicago, Aug. 8.—Following the advance in steel bars early last week, the leading interest, followed by independents, made a similar advance on structural shapes, effective Aug. 4, making the price 2.70c, Chicago mill.

Fabricators are figuring on a large tonnage of work, although most of this is in small lots. Business closed during the past week in the west includes a larger number of items than usual, but tonnages are small. The largest consist of 662 tons for a machine shop extension at the Gary works of the Illinois Steel Co., and 633 tons for a power house at Holter, Mont., for the Montana Power Co.

May Retard Building

Cleveland, Aug. 8.—The advance of $2 in quotations on shapes is likely to retard some building projects, as leading sellers have found it rather difficult to place business at prices which have prevailed recently. In the case of the La Salle & Koch department store, Toledo, which has been pending for some time, it was expected that about 3,500 tons of structural steel would be needed, but it has been decided to use reinforced concret construction, and only a few hundred tons of shapes will be needed. A. Bentley & Sons, Toledo, have the general contract.

Increased Inquiry

Buffalo, Aug. 8. — The advance in prices by the leading interest and other producers to 2.60 has resulted in a noticeable increase in the inquiry instead of tending to check the buying movement that has developed. Users are the more anxious to have booked their contract needs on the basis of the new prices than they were when the mills were accepting $2 less per ton than at present. In the matter of the heavier sections, some of the mills are able to make deliveries within the present year, but on the general run of the lighter sections there seems to be little or no tonnage available before well into the first quarter of 1917.

(For complete prices see page 298.)

CONTRACTS AWARDED.

The Jones & Laughlin Steel Co. has been awarded a contract for about 700 or 800 tons of material for a building for the Ireland & Mathews Co., Detroit.

Illinois Steel Co., extension to machine shop, Gary, Ind., 662 tons, to American Bridge Co.

Montana Power Co., pier nosings, rack frames and power house, Holter, Mont., 633 tons, to American Bridge Co.

State hospital buildings, Alton, Ill., 494 tons, to Decatur Bridge Co.

Steel for remodeling present state capitol building, Jackson, Miss., 331 tons, to American Bridge Co.

Denver & Rio Grande R. R. Co., bridges, Colorado and Utah, 288 tons, to American Bridge Co.

St. Louis Southwestern Ry., two single track pony truss spans, 267 tons, to American Bridge Co.

Addition to Harrington Hotel, Washington, D. C., 500 to 600 tons, to Barber & Ross.

Bridge work for the Reading railroad, 180 tons, to the McClintic-Marshall Co.

Extensions to open hearth plant of the Brier Hill Steel Co., Youngstown, 2,000 tons, to the Lackawanna Bridge Co.

Bridge work for the Cuba railroad, 350 to 400 tons, to Milliken Bros., Inc.

New buildings for the Aluminum Co. of America, Massena Springs, N. Y., 900 tons, to the Jones & Laughlin Steel Co.

Brooklyn-Edison Co., Brooklyn, N. Y., 250 tons, the Fort Pitt Bridge Works.

CONTRACTS PENDING.

Court house, Eaton, O.; 500 tons; bids being taken.

Steel truss bridge across Little Miami river at Xenia, O. Plans being prepared.

Steel truss bridge across river at Lisbon, O. Commissioners of Columbiana county taking bids until Aug. 14. Tonnage withheld.

Bridge work and freight house at Connellsville, Pa., for the Pennsylvania railroad, 1,000 to 1,200 tons, bids being taken.

Power house, Waterloo, Ia., for Consolidated Gas Co., 400 tons, bids being taken.

Building for Franklin Trust Co., Philadelphia, 600 to 700 tons, bids being taken.

Bridge work in Ohio for Baltimore & Ohio railroad, 200 tons bids being taken.

Borchardt apartment, Seventy-fifth street and Park avenue, New York City, 700 tons, bids being taken.

Herzog apartments, Seventy-second street and West End avenue and 64 East Eighty-sixth street, New York City, 700 tons, each, bids being taken.

New Abbott Road Bridge, Buffalo, city getting ready to advertise for bids for bascule steel bridge, taking about 1,000 tons.

More than half of the 500 employes of the Holtzer-Cabot Electric Co., Roxbury, Mass., walked out Aug. 3, because it refused to grant them a 50-hour week, instead of the present schedule of 53¾ hours. Officials of the company say that as practically every competing concern in Boston is working on a 55-hour week basis, the company does not feel it can grant the demands.

Sheet Market

Shows Considerable Irregularity—Blue Annealed Prices Decline

Youngstown, O., Aug. 8.—The sheet market still is marked with the uncertainty which has prevailed during the past few weeks. The low prices which followed a softening of the market at the first of the month have not changed, although the price of sheet bars has been advanced and production has been reduced from 15 to 20 per cent due to the extremely warm weather. Black sheets, No. 28 are being sold at from 2.75c to 3c, but in the absence of an active demand for this product, the prices are more or less nominal.

Galvanized sheets are selling at 4.25c, the minimum established by a slight decline in spelter about a week ago. With the cost of sheet bars soaring, labor uncertain, and spelter wavering, the task of estimating production costs has become a difficult proposition.

The demand for blue annealed sheets is unusually active. After a period of several months in which European buyers have not appeared in the market, foreign inquiries for substantial tonnages are again being received. One mill has taken orders for approximately 5,000 tons, and several other transactions involving good tonnages are reported. Blue annealed sheets, No. 10 are quoted at 2.85c to 3c.

Buying on Lower Basis

Philadelphia, Aug. 7. — Settling prices have continued to mark the eastern sheet situation. Eastern mills, as a rule, now hold No. 10 gage blue annealed at 3c to 3.25c, Pittsburgh, or 3.159c to 3.409c, Philadelphia, on last quarter or first quarter contracts, but it is understood lower has been done to meet competition from makers in the Pittsburgh and surrounding districts. Some forward buying by eastern consumers now is being done.

Sheets are Firmer

Chicago, Aug. 8.—Somewhat firmer prices are being asked for steel sheets, as more expensive sheet bars are coming into use during third quarter. No. 28 gage black sheets are obtainable on a basis of 2.99c, Chicago mill, although some makers are asking $2 per ton higher. No. 10 gage blue annealed may be obtained at 3.09c to 3.19c, Chicago mill. No. 28 gage galvanized vary somewhat in price, but are obtainable easily at 4.20c to 4.40c, Chicago.

Consumers Want Next Year's Sheets

Pittsburgh, Aug. 8.—Many of the more important consumers of sheet bars have opened negotiations for material for 1917 shipment. From statements made by sales managers, it is not believed that books for next year's delivery will be opened for a month or longer. Sheet manufacturers do not know what prices they will pay for raw material, and the labor situation still is unsettled.

Specifications against contracts continue heavy, but it is apparent that some mills are in a position to make deliveries more promptly than previously, since the market for nearby shipment is both irregular and uncertain. A few mills that had been quoting No. 28 gage black sheets at 3c have reduced their price to 2.90c and it is understood that some of the more common gages have been offered at considerably less than 2.90c, base. Irregularity reflected by black sheets is attributed to the absence of demand for galvanized products. Although galvanized material is selling at comparatively low figures, most consumers will not buy at prevailing prices, unless absolutely necessary. Galvanized products continue to be offered at 4.25c for No. 28 gage. Blue annealed sheets are being quoted at 3c and above by most mills in this district. Tin mill black sheets are decidedly scarce and no evidence is found of prices below 3c for No. 28 gage.

Tin Plate Scarce

Pittsburgh, Aug. 8.—Leading manufacturers of tin plate in the Greater Pittsburgh district appear confident of their ability to limit consumers to six-months contracts when books for the 1917 season are opened. Can makers in past years have obtained material for delivery over 12-months periods and it is likely that they will endeavor to keep up traditions when covering needs for the 1917 season.

Demand for tin plate is decidedly heavy. The extreme heat of the last few weeks has led to the belief that the canning season for many products will open earlier than usual. Manufacturers of cans are endeavoring to hasten shipments and to obtain additional tonnages, if possible. Tin plate is firmly held at $6, base.

The McKeesport Tin Plate Co. is putting into operation five additional mills at McKeesport, Pa., and hopes to complete 15 more mills within the next 60 days. The Standard Tin Plate Co., Cannonsburg, Pa., is operating its new capacity, consisting of 10 additional mills. The American Sheet & Tin Plate Co. probably will not be able to operate its new plant at Gary, Ind., in full until the latter part of the year.

(*For complete prices see page 298.*)

Cast Pipe Makers

Are Not Pleased by Proposal to Increase Freight Rates

Birmingham, Ala., Aug. 7. — The proposed increase in freight rates on cast iron pipe from the district to far western points has added to the discomfort of pipe producers. The pipe market has not been very strong and active for several weeks past, and producers express the opinion that the acuteness of the situation will be accentuated. There has been no change in prices, and producers report only a fair tonnage coming up for consideration.

Important Export Inquiry

New York, Aug. 8.—Numerous export inquiries for cast iron pipe again are appearing. Most of these are for Cuba and have been put out by the American Trading Co. of this city. There are at least four or five inquiries for Cuba now in the market. One of these calls for 1,500 to 2,000 tons of 3 to 24's, for Cardenas, Cuba, another for 750 tons and a third for 550 tons and still another of about the same amount, of 4, 6 and 8's. Norway also is in the market for some tonnage. Several other export propositions are receiving the attention of eastern shops. An iron pipe company recently asked for 40 miles of 22, 26 and 30-inch high pressure pipe for export requiring upwards of 10,000 tons, but nothing has come of this to date. Domestic business continues slow. New York will take bids Aug. 17 on a contractor's letting involving several hundred tons. R. D. Wood & Co. are the low bidders on 110 tons of 6 to 16's for Bloomfield, N. J. Private buying is good. Prices are steady.

Business Small

Chicago, Aug. 8.—Demand for cast iron pipe continues to be confined to small tonnages, and cities seem slow to close on their inquiries. The United States Cast Iron Pipe & Foundry Co. has taken 150 tons at Garrison, N. D.

George Ruben Page, 24 years old, was killed in an automobile accident at Gettysburg, Pa., Aug. 5. He was employed by the American Steel & Wire Co., at Donora, Pa. His father, George S. Page, is manager of the Park Works of the Crucible Steel Co. of America, Pittsburgh. He was a nephew of Charles M. Schwab, of the Bethlehem Steel Co., and of A. C. Dinkey, of the Midvale Steel & Ordnance Co.

Scrap Lags

With Very Little Activity in the Leading Centers

Pittsburgh, Aug. 8.—The market for iron and steel scrap in western Pennsylvania is almost at a standstill. Not enough tonnage has been sold recently to test prices. Some blast furnaces recently bought turnings and borings at less than $8, delivered, but that figure now appears to represent the market. Dealers have large tonnages of all grades on hand and it is not unlikely that prices will dip further before any actual improvement is noted.

Chicago Scrap Quiet

Chicago, Aug. 8.—Although no buying of iron and steel scrap is being done, conditions underlying the market are such that dealers believe there will be heavy demand and higher prices before the end of the present year. Considerable tonnages of heavier steel scrap are being shipped to Pittsburgh and the valleys on contracts made some months ago. This has had the effect of stiffening prices somewhat, although the change is not marked.

Railroad offerings are not unusual, and tonnages are being taken up without difficulty. The Union Pacific railroad offers 1,550 tons; the Minneapolis, St. Paul & Sault Ste. Marie railroad, 480 tons; the Chicago, Milwaukee & St. Paul, 750 tons, and the Wabash railroad, 800 tons.

Confined to Dealers

Philadelphia, Aug. 7.—Old business continues to govern the scrap market in this territory and any buying is largely by dealers against unfilled orders. The lifting for one week of the freight embargo against the Lukens Iron & Steel Co., Coatesville, and the promise of similar action in the case of the Worth Bros. plant at the same point have stimulated some of this buying. In general, the market is very dull and simply is drifting. Sales of heavy melting steel to dealers in one case at $15 and in another at $14.50, of borings at $8.75; of turnings at $9.75 to $10.25; of No. 1 forge at $13, and of wrought pipe at $13, all delivered eastern Pennsylvania, are noted. One eastern Pennsylvania maker sold a lot of low phosphorus crop ends at $23, mill.

Market Weak Again.

Cincinnati, Aug. 8.—The scrap market has settled back again into a weak condition after several weeks of optimism and better feeling among dealers. The buying movement that has been expected here since the middle of July has not developed, and as a result the market could not withstand the continued lack of demand from which there appears to be no relief. Both rolling mills and foundries state that they have enough scrap contracted for to cover all requirements until Jan. 1. A large eastern consumer who is in this market for 50,000 tons of cast borings could not be supplied by local dealers because of freight rates, and the fact that cast borings are hard to obtain in such large lots. This material is quoted today in this market as low as from $4.50 to $5, per net ton. Heavy melting scrap is being offered by dealers at $14.50 to $15, per gross ton.

Many Obstacles.

Cleveland, Aug. 8.—The scrap market continues extremely dull, due in part to the regular summer depression of vacation season, and also to the great obstacles in the way of shipments. Many mills in this section are either embargoed by the railroads or else mill managers are asking shipments to be held back until congestion is relieved. Perhaps the latter condition is working the greater hardship on dealers, for they cannot ship scrap that has already been sold.

Local mills are uninterested in the market because they are stocked up. Foundries are doing an extremely small amount of buying. Machine shop turnings are especially weak, being held at $5.75 a net ton, Cleveland. Quotations as low as $5.50 at same point, have been heard. Heavy melting steel is sentimentally stronger due to a temporary lessening of the supply from yards which have lost capacity due to effect of heat on workmen. Quotations on heavy melting steel, however, remain unchanged at $14.75 to $15.25, a gross ton. Prices, as a rule, have shown little or no change in the past week.

Heavy Melting Active

Buffalo, Aug. 8.—Dealers of the Buffalo district report an increase in the activity in heavy melting steel, with the bulk of the tonnage moved going to the Pittsburgh and valley districts. Other lines in the list are being moved to some extent, but the sales, for the most part, are in small lots. The trading has resulted in no changes in prices from the schedules previously reported.

Very Little Buying

St. Louis, Aug. 7.—Few sales of scrap iron were reported here last week and most of the transactions were between brokers. Owing to the continued hot weather, the mills are not consuming a very large amount of scrap, and for this reason, additional purchases by consumers have been delayed. There is a firm tone to the market, however, and brokers confidently expect prices to advance.

(For complete prices see page 298.)

Market Lifeless

New York, Aug. 8.—Practically no new business of consequence is being placed in old material and the market continues lifeless. Consumers appear to be absolutely disinterested in making any further purchases at this time and trading opportunities are extremely rare. Prices are undergoing little quotable change, but scarcely are tested. Some offers for heavy melting steel at $18, delivered, are coming from the Pittsburgh district. This figure is not attractive enough to draw much tonnage from the east.

Not Interested.

Birmingham, Ala., Aug. 7. — Consumers of scrap in the local market have manifested very little interest in old material of any kind. One dealer reports a sale of a few cars of light and heavy steel scrap, but confesses that cast scrap demand is nil. Prices are more or less irregular, and sales are principally made at buyers' figures.

Nuts, Bolts and Rivets

Pittsburgh, Aug. 8.—The recent advance in the price of steel bars has strengthened the market for nuts, bolts and rivets in this district. Some irregularity continues to exist in the west, where jobbers recently have offered stocks at rather low prices. Structural rivets are commanding 4c and boiler rivets 4.10c in this district.

Cold Rolled Strip Steel

Pittsburgh, Aug. 8.—Manufacturers of cold rolled strip steel continue to refuse to protect customers against declines in price, as has been the case for several months. Rather heavy tonnages are being sold at a range from 6c to 6.50c for future delivery. Books for shipment after Dec. 31, next, have not been opened.

Warehouses Busy

Cincinnati, Aug. 8. — Warehouse prices continue unchanged and strong. The present good weather, which has been a boon to building operations, has brought out such a large demand for building materials, that warehouses are hard pressed for twisted reinforcing bars and light structurals.

Billets Scarce

And Munition Makers Have Trouble Filling Requirements

Philadelphia, Aug. 7.—Manufacturers of munitions for foreign governments located in this territory, who recently have booked new contracts are inquiring freely for steel but find it difficult to get material. A locomotive builder has asked for 26,000 tons of 6⅜-inch rounds, or of billets approximating this size, and has gone so far as to offer to furnish the ingots, if the mills will do the rolling. Various makers have declined to quote on this business. One lot of 6,000 tons of shell steel has been closed by a munition plant with an eastern Pennsylvania maker. An export inquiry for 9,000 tons of 5-inch round-cornered billets, French specifications, has been put out in this district and the buyers will pay $60, Pittsburgh. Another new export inquiry calls for 5,000 tons of open hearth ingots for Spain. Foreign inquiries are very liberal. There is not much semi-finished steel buying by domestic consumers apart from munition plants. Prices continue to show more firmness at $45 to $50, eastern mill, for open hearth rerolling billets. Forging billets, ordinary quality, are quoted by eastern producers at $65, mill.

Stronger at Pittsburgh

Pittsburgh, Aug. 8.—Tremendous demand for billets and sheet bars for domestic and foreign delivery has enabled manufacturers to put up prices from $2 to $5 a ton. Domestic consumers are complaining about deferred and delayed deliveries. Foreign interests literally are pounding at our doors for material. Representatives of some of the larger consumers of billets and sheet bars in England are in this country endeavoring to buy all available tonnages. As high as $46, Pittsburgh, has been paid for one lot of about 5,000 tons of bessemer sheet bars and that figure has been offered for billets. Brokers have sold almost all the tonnage shipped abroad; some of them have been able to enjoy very remunerative prices, having obtained options on material some time ago at considerably less than prevailing prices. It frequently is predicted that both billets and sheet bars will command $50 a ton a few weeks hence. No change in the price of wire rods has been made, but it is believed that the advance in the price of finished wire products, effective last Saturday, will tend to stiffen the price of wire rods. It is reported that one of the larger mills in this district has sold heavy tonnages of billet discards for export. Although this report cannot be confirmed, it is accepted generally as reliable.

Very Strong Demand

Youngstown, O., Aug. 8.—The demand for semi-finished steel is exceeding the capacity of the mills to a degree rarely, if ever, before experienced. Most of the inquiries are for shell steel for domestic and foreign buyers, but there is also a tremendous demand for billets, slabs and sheet bars, mostly for over-sea delivery.

The prices for all semi-finished products have advanced during the past week, the minimum quotation of $40 having been superseded by $45. Several large sales at $50 have been reported, and in several instances foreign buyers have apparently disregarded the problem of price in their endeavor to find manufacturers to fill their orders. As a rule the mills are supplying the needs of their regular customers in preference to taking on business from European consumers. This policy has brought about the unique situation whereby extremely large inquiries are being turned back to the prospective purchasers. An English buyer in the market for billets to be delivered at the rate of 5,000 tons each month until the end of the war was unable to place the business with one mill on account of its sold-up condition. Inquiries involving an aggregate of 50,000 tons have been turned down by another manufacturer for the same reason.

According to the estimates of several officials, the production of the mills in this district has been decreased about 15 or 20 per cent by the hot weather.

Will Build New Stack

Chicago, Aug. 1.—The Iroquois Iron Co., at South Chicago, which was recently bought by the Semet-Solvay Coke Co., of Syracuse, and other interests, announces that it will erect a fifth blast furnace stack in the near future, the time depending upon the lowering of cost of material entering into the furnace.

The Iroquois Co. recently bought from the American Smelting & Refining Co. a tract of 10 acres in South Chicago, adjoining its other real estate holdings, at a cost of $107,000. No announcement is made as to the purpose to which this added space will be devoted and it is believed it was acquired simply to provide for future development at the Iroquois plant.

Forty of the employes of the Parsons Foundry Co., Bridgeport, Conn., have walked out because their demands for more money were not granted. It is the sixth plant in that city in which there are strikes.

(For complete prices see page 298.)

Pig Iron Output

Shows a Decided Increase — Finished Materials Also Gain

Cleveland, Aug. 8.—The strong foreign demand for pig iron which has prevailed during the past few months is beginning to be reflected in the report of exports compiled by the bureau of statistics of the department of commerce. In June of this year, exports of pig iron amounted to 48,770 tons, compared with 22,111 tons in June, 1915, and 28,293 tons in May, 1916. Exports of scrap show a large increase in June compared with May, and still larger as compared with June of last year. Exports of billets, wire nails and wire rods also show decided increases. The total exports for the year ending with June were 4,599,016 tons, compared with 1,851,206 tons for the year ending June, 1915.

According to the report of the bureau, the imports of manganese ore for June amounted to 58,143 tons, compared with 74,825 tons in May and 31,011 tons in June, 1915. With the exception of manganese ore, imports were small, the largest tonnage being 13,846 tons of pig iron.

IRON AND STEEL IMPORTS, GROSS TONS.

	June,		Twelve months ending June,	
	1916.	1915.	1916.	1915.
Pig iron	13,896	10,281	118,187	107,400
Scrap	3,868	2,833	96,012	32,667
Bar iron	1,251	664	8,241	10,284
Structural	277	15	1,582	5,540
Ingots, blooms and billets of steel	2,207	718	23,960	24,550
Rails	4,711	17,046	53,944	55,092
Sh'ts and plates	91	102	1,709	2,560
Tin & terne plate	91	75	802	4,750
Wire rods	494	468	4,620	4,810
Manganese ore	58,143	31,011	492,860	206,859
Total	84,929	63,213	801,917	454,512

IRON AND STEEL EXPORTS GROSS TONS.

	June,		Twelve months ending June,	
	1916.	1915.	1916.	1915.
Pig iron	48,770	22,111	286,728	130,594
Scrap	15,867	7,280	154,709	29,830
Bar iron	6,056	2,273	70,518	12,343
Steel bars	61,017	58,452	625,600	230,330
Wire rods	18,046	18,137	171,530	98,440
Billets, ingots and blooms of steel	116,425	48,999	962,206	220,416
Bolts, nuts, rivets and washers	2,156	1,481	30,850	13,500
Hoops, band and scroll	4,007	2,009	41,260	10,630
Horseshoes	1,368	2,956	13,130	13,020
Cut nails	372	408	4,425	2,643
Wire nails	17,100	10,180	128,700	55,500
R. R. spikes	2,100	604	26,410	5,490
All oth. nails inc. tacks	1,067	1,266	9,640	5,450
Cast radiators	193	205	2,363	2,669
Pipes & fit'gs. cast	5,880	5,050	52,600	62,400
wrought	12,160	15,070	125,700	117,700
Steel rails	481,881	37,547	540,919	159,587
Sh'ts & plates	42,590	41,710	487,000	284,400
Struc. iron and steel	25,034	22,852	269,928	168,664
Tin and terne plates	29,750	7,580	230,500	80,000
Barbed wire	37,500	22,790	364,300	147,600
All other wire	30,330	27,140	.....	.....
Total	526,759	356,430	4,599,016	1,851,206

Shell Steel Market is Feverish

Tremendous Tonnages Are Pending and Buyers Are Having Trouble in Covering Their Requirements

New York, Aug. 8.—A tremendous tonnage of steel for shells continues to be actively sought from the mills and the amounts are so large and the prospects for highly profitable business so promising that the market has taken a feverish turn. In some of these propositions now active, especially those of direct buying by representatives of foreign governments, no amounts are specified and the favored mills are being given the opportunity to name their own tonnages for delivery over the first six months of 1917. The full extent of the movement in point of tonngae, therefore, does not permit of an accurate estimate at this time, but it is stated by those who are directly identified with the negotiations that 500,000 tons will scarcely cover the orders recently placed or now pending. One mill reports definite inquiries on hand for 200,000 tons and this does not include some matters where the quantities are to be fixed later. French munition works have closed with the Steel Corporation for a large tonnage of rounds, the amount of which has not been stated, to be delivered over the first half of 1917. It is understood this order will be filled at Ensley. This lot is only a portion of the requirements of these munition makers who remain in the market for a heavy amount. J. P. Morgan & Co. are carrying on some heavy negotiations for shell steel and forgings for direct export, much of which is reported to be for the British. Some new finished shell orders also are being placed, including a $15,000,000 contract for 6-inch to the Baldwin Locomotive Works, which now is in the market for 26,000 tons of 6⅜-inch rounds. The latest order to the American Locomotive Co. is for 125,000 9.2-inch shells, worth $6,000,000 to $7,000,000 and calling for about 20,000 tons of steel. This company has been buying steel heavily, as its needs for recent orders are placed at around 75,000 tons. The Pressed Steel Car Co. has several new contracts for forgings, chiefly for 9.2-inch shells. The American Steel Foundries Co. also has been a large buyer of steel, closing for 30,000 to 35,000 tons. This company officially announces its new order is for delivery by April 1, 1917. A Cleveland manufacturer asks for 15,000 tons; a New York state equipment maker for 25,000 tons; a Brooklyn plant for 20,000 tons or more, and there are various other requirements definitely before makers. The mills are holding large rounds, such as 3¼-inch and over at from 3.50c to 4c, mill, depending upon the conditions surrounding the particular transaction. In view of the large-sized shells ordered in the latest contracts, the mills will be unable to supply rounds of sufficient diameter, especially for the 8 and 9.2-inch projectiles, since the rolling capacities of leading producers do not extend beyond 7½-inch. Accordingly, the shellmakers will be obliged to buy blooms or billets. It is interesting to note in this connection that one independent mill now is rolling 10-inch rounds for 9.2-inch shells, largely for the needs of affiliated companies. There are also some large foreign inquiries for shrapnel rounds, of approximately 3¼-inch diameter, now in the market, and important business of this kind is on the verge of being closed. Most of the buyers of shell steel are meeting with difficulty in covering their requirements, because with heavy backlogs of orders now on their books, the mills have only limited tonnages free for the first quarter or half of 1917 and they are quite independent in their negotiations.

Many Inquiries

Pittsburgh, Aug. 9.—Manufacturers of billets are receiving numerous inquiries for shell steel for domestic and foreign shipment. It is estimated that more than 50,000 tons are involved in pending negotiations in this district. From 3½ cents to 4¼ cents per pound is being paid for forging billets and premium prices are being offered for Gothic billets. One lot of about 10,000 tons of forging billets commanded 4.20c per pound a few days ago.

Nine Steamers Sold

The Great Lakes & St. Lawrence Transportation Co. has just completed negotiations with Elwell & Co., New York, for the sale of nine bulk lake freighters. It is understood that the New York firm acted in behalf of French interests and that the boats are destined for the coal trade. It is thought that the boats will leave the lakes before the end of the season, and as all are equipped for salt water service, and are of Welland canal size, no delays are likely to be encountered. The steamers included in the sale are as follows: John Crerar, H. G. Dalton, A. D. Davidson, George C. Howe, J. S. Koofe, John Lambert, A. M. Marshall, S. N. Parent and Robert Wallace. With the passing of this fleet, few American vessels of Welland canal size remain on the lakes, as a large number of ships of this type have been sold during the last year.

(*For complete prices see page 298.*)

Wire Advanced

Prices Marked Up $2 Excepting Manufacturers' Wire

Pittsburgh, Aug. 8.—Effective Saturday, Aug. 5, the American Steel & Wire Co. advanced its price of all wire products, excepting manufacturers' wire, $2 a ton. The advance has been expected for some time. Wire nails now are held at $2.60 a keg; plain wire at $2.55 and galvanized wire at $3.25 per 100 pounds. Cement coated nails and cut nails likely will be advanced before the end of this week. The former is held at $2.50 and the latter at $2.60 per 100 pounds.

The last previous advance in the price of wire products was made May 1, when products were put up from $2 to $4 a ton. Since that date nails had been quoted at $2.50 a keg; plain wire, $2.45 and galvanized wire at $3.25 per 100 pounds. Manufacturers' wire was advanced $4 a ton to $2.65 per 100 pounds several weeks ago.

No change was made in the differential for galvanizing wire. On Aug. 23, 1915, the American company adopted the 70-cent differential and that spread continues to exist. On Aug. 23, 1915, spelter was quoted at 11.50c to 11.75c a pound at St. Louis; today it is listed at a range from 8.75c to 9c. The differential for galvanizing wire material fluctuated considerably the first half of 1915. For some time before the year of 1915, the differential had been 40c and it was 30c per 100 pounds not many years ago.

Wire For Navy

New York, Aug. 8.—The American Steel & Wire Co. is the low bidder on the wire nail requirements of the various navy yards for the last half of the year, estimated at about 15,000 kegs, under a recent proposal.

Iron and Steel

May Be Included in the Munitions Tax Provision

Washington, Aug. 8.—The sub-committee on munitions of the Senate finance committee has voted to recommend important changes in the munitions tax provisions of the general revenue bill. These changes, greatly extending the scope of the application of this tax, will undoubtedly be adopted by the whole committee and incorporated in its report.

The sub-committee's amendments would reduce the 1, 2 and 3 per cent taxes on copper production and add steel, iron, lead and zinc to the list of taxable metals used in munitions manufacturing. Senator Stone, of Missouri, chairman of the sub-committee, refused to disclose the amount of the proposed taxes, which have not yet been considered by the full Democratic membership of the committee.

Agitation for such an extension in the munitions taxes has recently been promoted by a number of Democratic senators at the instance of certain munitions manufacturers who feel that the limited taxes imposed by the bill as it passed the House are unjust and discriminatory.

Joseph Kirby Jr., of Dayton, former president of the National Association of Manufacturers, was here last week with a number of Ohio men interested in munitions contracts. They conferred with Senator Pomerene and urged that the house bill be so altered as to distribute the burden of the munitions tax among the hundreds of concerns which handle munitions sub-contracts. Only the original contractors would be taxed under the bill as it stands, they said.

The Senate committee has voted into the bill reduction of the income tax exemption from $3,000 to $2,000 for single persons and from $4,000 to $3,000 for married persons, the rate likewise being reduced from 2 to 1 per cent.

The committee is not expected to complete its work before the latter part of this week. Before reporting to the senate, the committee will submit the measure, together with all proposed changes, to a caucus of the Democratic senators.

Will Reroll Rails.—The Witherow Steel Co., Pittsburgh, is building a plant on Neville Island for rerolling rails. All of the rolling mill equipment will be electrically driven. Equipment includes a 15-inch slitting stand, two complete trains of 14-inch mills and one train of 9-inch mills, each to be driven by a 500-horse-power motor. The Schlieper Engineering Co., Ferguson building, Pittsburgh, of which J. E. Schlieper is head, is in charge of the engineering work.

Lower Rates on Molding Sand

Foundrymen of Ohio are now benefiting from the successful efforts made by the Ohio Sand Traffic Association to secure a reduction in railroad rates on silica and molding sands. This association has been active in opposing the attempts of the railroads to increase by 15 per cent the rates on molding and silica sand shipped in box cars. The railroads secured permission from the public utilities commission of Ohio to put this advance into effect, beginning April 1. As a result of the activities of the Ohio Sand Traffic Association, which was organized especially to secure relief from this discrimination, this advance was withdrawn, the old rates being in effect since June 20.

The association in appearing before the commission pointed out the unjust discrimination in advancing rates on box car shipments as compared with gondola shipments. Users of the higher grades of sand invariably receive their shipments in box cars, the commoner grades of sand moving in gondolas. As a result, the bulk of the advance fell on Ohio foundrymen. This advance related only to intrastate movement. As a result, in one instance a foundryman in Toledo was paying $1.21 on box car shipments against a rate of $1.16 to Detroit, which was 69 miles further.

The association was formed with the following members: Central Silica Co., Zanesville; Gordon Sand Co., Conneaut; Interstate Sand Co., Zanesville; H. A. Keener, Columbus; New Lexington Sand Co., New Lexington; Portage Silica Co., Youngstown; Standard Sand & Machine Co., Cleveland; Superior Sand Co., Cleveland; Summit Silica Co., Barberton, and National Sand & Stone Co., Niles. The association enlisted the services of the Lent Traffic Co., Pittsburgh.

The members of the association have decided to continue the organization with a view of promoting the interests of their industry.

About 125 employes of the Champion Horseshoe Co., Pawtucket, R. I., have struck because it refused to grant a wage increase of 12½ per cent. The strikers are members of the Amalgamated Association of Iron, Steel and Tin Workers.

Benzol Output

Has Increased Very Rapidly in the United States

Recovery of by-products from American coke manufacture made big advances in 1915 and now has attained the proportions of an important industry. The value of these by-products last year was nearly $30,000,000, a large increase over the previous high-water mark of $17,500,000 in 1914. Although material increases appear in the output and value of gas, tar and ammonia, which was to be expected with a greater output of by-product coke, the increase in benzol products was remarkable and presented the most interesting feature of the year in the coke industry. The value of these products rose from less than $1,000,000 in 1914 to more than $7,760,000 in 1915, according to C. E. Lesher, of the United States geological survey. Benzol has been recovered in this country from coke-oven gas for a number of years, but prior to 1915 the market was small and the prices low.

The benzol products obtained in 1915 amounted to 16,600,657 gallons. More than 13,000,000 gallons of the total output was reported as crude, therefore it is not feasible to publish the statistics of their production for that or previous years. In 1914 there were 14 benzol plants in the United States. Last year 16 additional coke plants were equipped with benzol apparatus, and the output was very greatly increased. The incentive for putting in this equipment was, of course, the opportunity to contract at war prices for benzol and other similar materials for use in making explosives for the European countries. When the demand from that source shall have ceased, the United States will be in possession of a large supply of the raw materials from which dyes and chemicals are made and will be able, if trade conditions are right, to enter into the manufacture of these products.

Some of the plants have installed their own stills and refineries, and the pure benzol reported from those sources amounted to 2,516,483 gallons, with an average value of nearly 57 cents, at least three times the value of crude benzol before the war, and 623,506 gallons of toluol, with an average value of $2.45 a gallon. Crude benzol, which in 1914 was used to some extent for motor fuel, contained the toluol, which now is separated out and sold at fancy prices.

Personals

Clyde K. Cairns, who has been connected with the American Tool Works Co., Cincinnati, has left that concern to become sales manager of the Cincinnati Pulley Machinery Co., Covington, Ky.

Wilfred G. Astle has been appointed purchasing agent for the Mathews Gravity Carrier Co., of Ellwood City, Pa. He was formerly connected with the Canadian Pacific Railway Co., the Dominion Power & Transmission Co., Hamilton, Ont. and the Toronto Electric Light Co., Toronto.

A. G. Ueberroth, chief of the cost department of the Bethlehem Steel Co., South Bethlehem, Pa., has been promoted to the office of works accountant at the Steelton, Pa., plant. He will be succeeded at South Bethlehem by Frank O. Ritter, assistant.

John Jeppson, superintendent of the Norton Co., Worcester, Mass., has been honored by King Gustave, of Sweden, who has bestowed upon him the Order of Knight of Vasa of the first class, the insignia being received in the shape of a medal last week. Mr. Jeppson, who is known as "the grand old man" to the Swedish residents of Worcester will be given a banquet by them in the Bancroft hotel, August 26.

Fred E. Gage, for the past five years superintendent of the central works of the American Steel & Wire Co., Worcester, Mass., has been transferred to the Rankin, Penn., plant of the company. He is succeeded by Edwin F. Barnes, assistant superintendent of the north works in the same city, whose place has been taken by Lester W. Perry, who has been superintendent of the flat wire department of that works. Dennis F. O'Day, a foreman there, succeeds Mr. Perry.

John Howard, superintendent of the Sheridan, Pa., blast furnace now being operated on ferro-manganese and spiegeleisen by E. J. Lavino & Co., Philadelphia, has had his duties extended to supervise the operations of the Meily furnace at Lebanon, Pa., which is going into blast to produce these alloys for the same interest. Harrison Prindle, who was superintendent of the Meily furnace, has resigned. Jos. E. Thropp Jr., formerly with the Alburtis, Pa., furnace of the Thomas Iron Co., has taken active charge of the Sheridan furnace under the supervision of Mr. Howard.

J. V. W. Reynders, formerly vice president of the Pennsylvania Steel Co., has opened offices in the Equitable building, 120 Broadway, New York, and is acting in an advisory capacity to financial interests engaged in the development of steel producing enterprises. His extensive experience in the actual management of steel works enables him not only to advise bankers in the purchase of bonds, but to see to it that the proceeds of the sales of bonds are spent to the best advantage and in such a manner as to produce earnings in the shortest possible space of time.

C. H. Millan, manager of the steel department of the Canada Cement Co., Montreal, Que., has resigned from that company. When the Canada Cement Co., started in to manufacture steel and other war munitions about two years ago, Mr. McMillan was taken from one of the large steel companies of the United States. His successor has been appointed in the person of C. Stendol, who was formerly with the Dominion Steel Corporation, of Sydney, N. S., and at a previous period held an important position with the Algoma Steel Co.

Death of T. J. Drummond

Thomas J. Drummond, president of the Lake Superior Corporation and the Canadian Iron Corporation, died suddenly at his summer home in Castine, Me., Sunday, Aug. 6. Mr. Drummond had been very prominent in the iron and steel manufacturing trade for many years. He was born in Tawley, Ireland, on Sept. 26, 1860, and received his education in the public schools of Montreal. In 1882 he became a partner in the firm of Drummond, McCall & Co., of Montreal, manufacturers of iron and steel. While with this wellknown concern he aided in the founding of the Montreal Car Wheel Co., the Canadian Iron Furnace Co., the Radnor Forges and the Drummond-McCall Pipe Foundry. Mr. Drummond was also president of the Algoma Steel Co., and the Algoma Central railway and held directorships in the Canadian Car & Foundry Co., the Cockshutt Plow Co. and the American Iron and Steel Institute.

THOMAS J. DRUMMOND

Rail Mills

Are Falling Behind in Deliveries—More Talk of Car Buying

New York, Aug. 8.—Some of the rail mills under the general pressure for crude steel, have fallen far behind in their deliveries both to domestic and foreign roads and the market now is witnessing efforts of makers to buy from each other to fill their contracts. Very few of the mills, however, are in shape to take on any further rail business for shipment before July, 1917. Canadian rail mills also are trying to cover some of their orders on this side, including contracts with roads in the United States. There is a more miscellaneous demand for rails from both domestic or foreign roads for both early and next spring delivery, but where any tonnages are involved great difficulty to close the order is being met with. On some of the export business now being placed, very fancy prices are obtainable by the mills. The Canadian Pacific, which has been in the market in this country for an amount up to 50,000 tons, has placed 15,000 tons in the Chicago district. The Havana Central has bought 5,000 tons, reported to have gone to an eastern mill. Another 5,000 to 10,000-ton export order has been closed. The Atlantic Coast Line recently asked for 5,000 tons and other domestic lines are in the market for supplemental lots.

There is more talk of car buying, but it still amounts to only talk for the roads are backward about placing orders at present prices. Those which have been in the market are very deliberate in making awards. The French government is reviving the inquiries which it recently had before builders calling for 2,000 or more cars and some action is expected before many days as well as with regard to the large Russian order the status of which is unchanged.

The American Locomotive Co. has received an order for nine small Mogul locomotives from the Russian government.

Some New Car Inquiry

Chicago, Aug. 8.—The New York Central railroad has issued an inquiry for 1,000 box cars, and the Lehigh Valley railroad has a similar inquiry for the same number. No action has been taken during the past week on inquiries pending.

Export Rails

Chicago, Aug. 8.—Demand for steel rails for export continues strong, and mills are taking as much of this tonnage as they can within their ability to make delivery. Domestic needs are practically covered, although occasionally small tonnages are being booked from American railways. A recent sale of nearly 10,000 tons of standard rails to go to Cuba is characteristic of the foreign business. Track fastenings are being bought for export in equal volume with rails.

More Shell Orders

New York, Aug. 9. (By wire.)—Further large orders include 8 and 9.2-inch shell forgings, placed by the British with leading industrial companies. One has just taken several million forgings, requiring about 50,000 tons of steel. Certain works are being offered all the munition business they can handle.

New Inquiries for Cars

New York, Aug. 9. (By wire.)—Car inquiries show up better, but there are few awards. New inquiries include 1,000 box cars for the New York Central, 500 box and 500 gondolas for the Nickel Plate, 500 to 1,000 box for the St. Louis & San Francisco, in addition to 1,000 hoppers.

Death of Major Adams

New York, Aug. 9. (By wire.)—Major Hugh Adams, a veteran of the iron trade of the metropolitan district, died at Yonkers Monday, aged 73. At various times he represented the Sloss-Sheffield, Tennessee, Wharton, Reading and other iron companies in the eastern trade. He was actively identified especially with the introduction of Alabama iron in the east.

Will Pay Bonus

Notices were posted Aug. 2 at the plant of the Youngstown Sheet & Tube Co., Youngstown, that a bonus of 10 per cent will be distributed Sept. 9, among those eligible to participate in the profit-sharing plan. The bonus system was introduced by the company in 1910.

The Non-Ferrous Metals

Copper Lead Spelter Tin

New York, Aug. 8.—With the exception of copper, the metal markets generally have been dull and weak during the week closing today. The sentiment underlying copper continues exceedingly strong and there have been a consistent although not active demand. The inquiry previously reported as having been put out by one of the belligerent governments for a large tonnage for shipment this year, has not yet been closed. Electrolytic is quoted as follows: Prompt and August 26.75c to 27c, cash; September and October, 26.25c to 26.75c, cash; November and December, 25.50c, cash. Demand for lake is very quiet. Prime lake is quoted as follows: Prompt and August, 26c to 26.50c, cash; September and October, 25.25c to 25.75c, cash; November and December, 24.75c to 25.25c, cash. Ordinary casting copper is quoted at 24c to 24.50c, cash, for prompt, 24c to 24.25c, cash, August and September shipment.

The American Smelting & Refining Co. last Wednesday reduced its price on lead from 6.50c to 6c, New York. This reduction brought out a better demand from domestic consumers, which, however, since has flattened out. There is an inquiry for from 1,000 to 2,000 tons for export to Russia. The outside market is quoted at 5.75c to 5.85c, St. Louis, and 5.90c to 6c, New York.

Demand for antimony continues quiet, and there is no interest in any of the positions excepting spot. The tone still is weak and buyers are bidding considerably below the market prices, with the result that material concessions occasionally are reported. For instance, last Thursday, when the market was around 12c, a lot of 10 tons was sold at 10.50c, duty paid. Spot now is quoted at about 11 to 11.50c, duty paid.

The aluminum market is quiet. No. 1 virgin ingots are quoted at 58c to 59c, No. 1 remelted at 56c to 57c, and No. 12 alloy at 45c to 47c. The 400 tons of material offered for resale by the Ford Motor Co. has not yet been closed out, it is believed.

In spelter there has been a fair business but at steadily receding prices, as sentiment has been exceptionally weak. This afternoon, however, due to a much improved volume of inquiry, the situation suddenly stiffened and higher quotations were heard. Prime western now is quoted as follows: Prompt, 8.25c, St. Louis; August, 8.12½c; September, 8c; last quarter, 7.75c. Brass special spelter is quoted at 8.75c to 9c, St. Louis. The government's preliminary mid year spelter report, issued yesterday, was favorable, showing stocks of 24,000 tons at smelters June 30, while the amount produced and available through the six months was about 330,000 tons.

The tin market was featured by a comparatively small volume of business, while prices continued to recede. Spot now is quoted at 37.70c, while steamer prices approximately are: August, 37.62½c; September, 37.50c; last quarter, 37.37½c.

(*For complete prices see page 298.*)

Manufacture of Copper-Coated Steel

MEN HAVE striven for ages to effect a satisfactory fusion of copper and steel, combining the mechanical strength of the latter with the ability of the former to resist the attacks of the elements — This article describes a method of fusing a copper coating on a core of steel which is said to be very serviceable

ALTHOUGH the welding of steel and copper first was undertaken centuries ago, but little was known about any of the processes until 1820, when a patent for a process for joining the two metals was granted in Germany. This method consisted of welding the two metals by pouring molten steel into tubes of copper. This amalgamation of the metals under the initial German process was satisfactory, but it proved to be too costly from a commercial standpoint, and the project was abandoned a few years after the patent was granted.

More than 50 patents have been taken out in this countrty for processes of welding steel and copper, but only a few of them have proved to be successful. Failures have been due largely to the inability of manufacturers to compensate for the difference in the coefficient of expansion of the two materials.

About a year ago, the Copper Clad Steel Co., Pittsburgh, was organized by J. M. Roth and a number of associates, who report that they have met with success in the manufacture of copper-clad steel in their plant at Rankin, Pa. The company was not formed until after Mr. Roth and J. W. Reisz, a graduate of the University of Berlin and Budapest University, who was employed as an engineer, had conducted experiments and tests for a period of 10 years. They developed what is said to be a satisfactory process in a laboratory in the Phipps Power building, Pittsburgh.

One Firm Operates Successfully

The latter part of 1915, special equipment for rolling copper-clad steel was installed in a building, 120 x 240 feet, at Rankin, where shipping facilities are provided by the Baltimore & Ohio and the Pittsburgh & Lake Erie railroads. The mill has been in operation since Jan. 1, 1916. The company is rolling copper-clad steel rods exclusively at present, but plans have been completed for the installation of additional machinery which will enable the concern to make a more diversified line of copper-clad products.

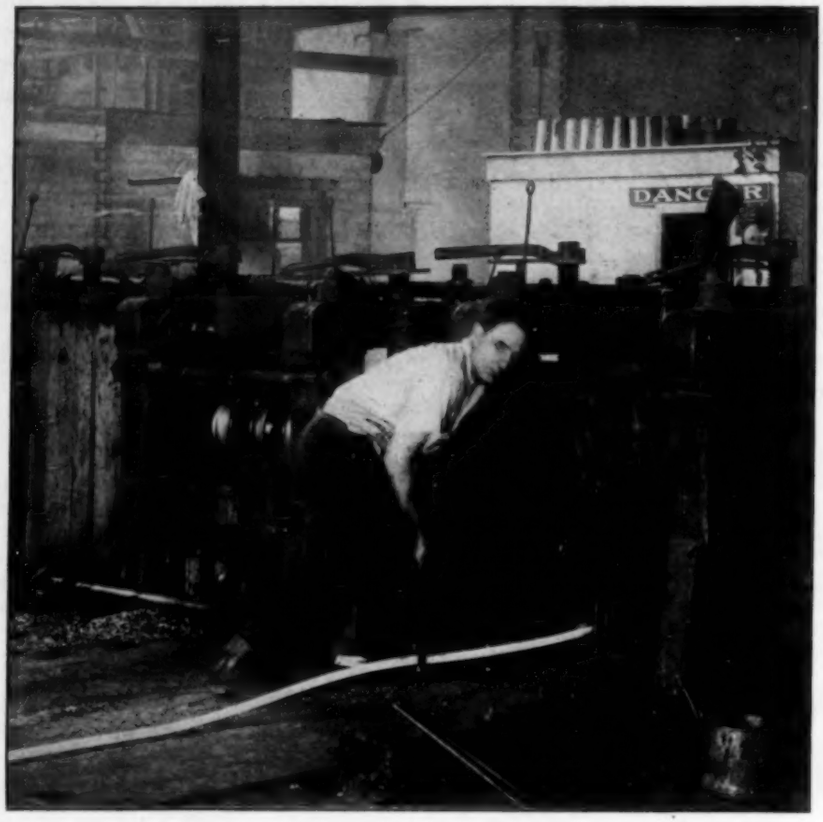
The company buys its raw material in the open market, in the form of steel rounds and copper ingots. The rounds, which average 15 feet in length, 4 and 4½ inches in diameter, are stored in the north end of the building, along a railroad siding which extends some distance into the plant. The rounds are cut to 30-inch lengths, by a cold saw built by the Espen-Lucas Machine Works, Philadelphia, after which they are pickled in a sulphuric acid bath, each length being washed carefully by hand. A magnet crane is used to carry the rounds to a laboratory, where the material is submerged in a small tank containing a liquid flux, the formula for which is secreet.

The prepared rounds are placed in plumbago molds of patented design, 30 inches in height and 5¼ inches in diameter, and are held firmly in position by centering pieces. Small buggies carry the molds, in sets of six each, to a preheating gas furnace of a special type, for heat treatment. After the rounds have been brought to the desired temperature, molten copper is poured into the molds from crucibles as shown in the illustration below. The copper is heated to a pouring temperature in an electric furnace having a capacity of 1,000 pounds per hour.

After the copper-clad rounds are sufficiently cooled they are removed from the molds and placed into a gas-fired heating furnace at the south end of the building, from which they are passed by hand to a 12-inch breaking down mill. They are reduced from 5¼ inches to 3¼ inches in diameter in six passes. The breaking down mill is of the 3-high type, designed especially for rolling copper-clad steel. From this mill, the rounds are returned to the heating furnace and after being reheated are

POURING COPPER INTO MOLDS

passed to a 12-inch and a 10-inch mill. Fifteen passes are required to reduce the rounds to ⅜ inch in diameter. The two 12-inch and the 10-inch mills are of the Belgian type, built especially for rolling copper-clad material. They are shown in the illustration. They have a capacity of 50 tons per day. The mills are driven by two electric motors furnished by the General Electric Co., Schenectady, N. Y., and the Westinghouse Electric & Mfg. Co., Pittsburgh. The motors have a combined capacity of 800 horsepower. Sample pieces are taken from each of the rods, which are wound in coils, and tests are made to determine the conductivity, the tensile strength and the elongation of the rods. A test bridge, furnished by the Leeds & Northrup Co., Philadelphia, is used to determine the conductivity. Severe tests are conducted to acsertain whether the weld is satisfactory and to determine the tensile strength and the elongation of the rods. According to officers of the company, tests indicate that the tensile strength of copper clad rods is 60 per cent greater than that of steel and the elongation is said to be 200 per cent greater than that of copper.



ROLLING COPPER-COATED STEEL ROUNDS

The Page Woven Wire Fence Co., Monessen, Pa., has completed arrangements with the Copper Clad Steel Co. through which it has secured exclusive control of the output of copper-clad rods to be drawn into copper-clad wire. The Copper Clad Steel Co. is installing a 12-inch, 3-high plate mill for the manufacture of copper-clad flats, and an 18-inch mill for rolling copper-clad sheets will soon be installed in an adjoining building, 120 x 150 feet. Plans have been completed for the installation of a large electric furnace which will take the place of the gas fired furnaces. The company, having a capital stock of $250,000, was incorporated by S. F. Loeb, S. E. Bramer and F. R. S. Kaplan, all of Pittsburgh. Mr. Roth is president; William Smith, formerly master mechanic of the Pennsylvania Steel Co., Steelton, Pa., is first vice president; Mr. Bramer is second vice president, and S. F. Loeb is treasurer of the company. Mr. Roth, Mr. Loeb and W. W. Hall, are members of the executive board and J. W. Reisz is chief engineer.

How Ferro-Carbon Titanium is Used

A STUDY of the use of ferro-carbon titanium in steel making is contained in a 110-page, 5¼ x 8¼-inch, cloth-covered book issued by the Titanium Alloy Mfg. Co., Niagara Falls, N. Y. The use of this metal in the manufacture of steel castings, forgings, structural steel, rails, sheet and tin plate, wire, skelp and bronze castings is discussed at length. The analysis of ferro carbon-titanium for steel manufacture follows: Titanium, 15.79 per cent; silicon, 1.41 per cent; carbon, 7.46 per cent; manganese, 0.11 per cent; aluminum, 0.80 per cent; phosphorus, 0.05 per cent, sulphur, 0.08 per cent and iron, by difference, 74.30 per cent.

The chapter devoted to the use of titanium in steel casting manufacture discusses the elimination of cracks and other unsound conditions, such as blow-holes, etc. The causes of cracks and other imperfections are briefly described and the method of treatment with ferro carbon-titanium is pointed out. This chapter also contains a paragraph on the treatment of electric steel for casting purposes. It is claimed that if from four to six pounds of titanium are added during the tapping of electric steel into the ladle, in the case of a basic-lined furnace, it will complete deoxidation, which may not have been thorough, due to impurities in the carbide of calcium slag, and it will take care of any reoxidation during the tapping. In the case of an acid lined furnace, it will complete the deoxidation of the steel and also in both cases, by the fluxing action of titanic oxide, it will free the metal from slag and oxide inclusions. It also may be stated that manufacturers of forgings would obtain much valuable information from the chapter devoted to the use of titanium in forging steels. The elimination of segregation seams and surface defects by the use of titanium is discussed and the method of making titanium additions in the basic and acid open hearths is pointed out. Similarly, the use of titanium in structural steel and in steel for rails is discussed. The chapter on rails considers the large number of defects which are found in untreated rail steel and sulphur prints are shown illustrating both treated and untreated sections. Under the caption of "Sheet and Plate Steels" the defects are classified as follows: Those due to the quality of the steel, mechanical defects, such as roll scale, etc.

Valuation of Natural Gas Rights

A DISCUSSION of the economic value of leaseholds on natural gas territory—The author points out the migratory nature of the gas and by reference to typical court cases shows the legal status of mineral and surface rights—The elements affecting the valuation of a leasehold are mentioned and emphasized

BY SAMUEL S. WYER

THE problem of correctly valuing natural gas leaseholds has not received the attention it merits. Its magnitude and economic importance become evident only when it is considered that natural gas is handled in 55 per cent of the gas distributing plants of the United States; that natural gas acreage forms 47 per cent of the known mineral acreage; and that five acres of land are now required to protect and maintain continuous service to each of the 2,000,000 domestic natural gas consumers in the United States. It must also be remembered that the cost of acquiring and maintaining this acreage represents a substantial part of the cost of the natural gas service to the customer, and that according to law, the right of a citizen by means of his ownership of or his mining leases on land to draw gas from beneath its surface is property.

Richard T. Sly, in *"Property and Contracts in Their Relations to the Distribution of Wealth,"* states that vested interests are economic interests which are legally recognized to be such that they cannot be impaired by public action, directly or indirectly, without indemnification. Vested interests are largely property interests. The recognition of an interest as a vested interest gives it some of the attributes of property, and by American courts it would be comprised in their very inclusive concept of property. Otherwise than through property, vested interests generally arise through contract.

Definition of Lease

A natural gas lease is a contract for a consideration establishing a vested right to enter upon a definitely described parcel of land, for a determined period, to prospect for, reduce to possession, remove and market natural gas. The vested right is the crux of the whole matter, and it is immaterial whether the instrument creating it is called a lease, contract, grant or deed of conveyance. According to Lindley, oil and gas leases, generally speaking, are not strictly leases as defined in the law of landlord and tenant. They are in the nature of written licenses, with a conditional grant conveying the grantor's interest in the gas or oil well, providing that gas and oil is found in paying quantities. It is well settled that the title of the lessee is inchoate until such discovery, at which point of time he acquires a vested estate in the mineral itself.

Origin and Meaning of Terms

In a given tract of land it is always a matter of doubt to what extent, if any, mineral may exist in paying quantities, until very considerable development work has been performed, which requires in most instances large expenditure of capital. For this and other reasons, a custom long ago arose for the owner of supposed mineral land to grant to a mine operator the right to enter upon the land and search for and extract mineral, and the form which the contracting parties pretty generally adopted to express their agreement was a "lease", which purported to entitle the "lessee" to occupy such part of the premises as was necessary to carry on his mining operations, and to use, mine and extract the minerals therefrom.

Property in the legal and economic sense means an absolute, entire and exclusive right to do anything, and embraces material things, labor or services and rights. It is important to bear in mind that the term means not only the thing owned but also every right which accompanies such ownership and is its incident. Thus, the right to drill at some future time a gas well on a certain parcel of land is property in the same sense that the land itself is property. A long line of court decisions has definitely established what the term property includes.

The science of valuation is an interdependent mixture of law, economics, and engineering law is necessary to establish the governing ethical principles; economics, to establish the criteria of value or monetary standards, and engineering, to apply the general criteria of value to any given specific case in accordance with ethical principles.

Value is the relation of two services, and implies utility and scarcity. The idea of value entered into the world for the first time when a man said to his brother, "Do this for me, and I will do that for you." They had come to an agreement. Then we could say the two services were worth each other. Value may be defined as the price of a given unity of wealth multiplied by the quantity or number of units, and hence is an expression of the relative desirability of different classes of wealth or property in terms of a common standard.

A price, when expressed in terms of a common standard of value, is the amount of money accepted in exchange for a unit of goods. Prices resulting from exchanges are agreements between two persons as to the value of a unit of property.

Wealth is defined as material objects owned by human beings. Property is the right represented by ownership, and is a material object itself. The benefits derived from wealth make its ownership desirable, and the right to enjoy these benefits is indicated by the term "property."

Although natural gas is a mineral, it cannot be measured in terms of acres, like coal, ore or solid minerals. On account of its fugitive and wandering nature it develops characteristics which differentiate natural gas valuation problems from all other mineral valuation questions. It is important to note that it is not a continuous process, but a fixed storage reservoir that must be considered, which storage will be depleted, without regeneration, as the supply is removed, and that the transportation from the mining district to the ultimate consumer can take place only through pipe lines.

Transient Nature of Mineral Values

In the administration of natural resources, we must bear in mind some important differences. Mineral rights and surface rights bear quite different relations to society. Surface rights have a permanent, underground rights but a transient value. The more intensely a farmer culti-

To be presented at the Arizona meeting of the American Institute of Mining Engineers, September, 1916. The author is a consulting engineer, Columbus, O.

vates his land, the more valuable does it become to him and to the community. Indeed, it is not possible to anticipate the maximum usefulness which surface rights may acquire; but we know that when these rights are being used to the best advantage the country is also reaping the greatest benefit, and it is then that the life of the right appears longest and most useful.

A mineral right is of a different nature. The more it is worked, the smaller becomes its intrinsic value. It is of value to the community only at the time, and in proportion to the extent of its productiveness; but the greater this temporary usefulness, the shorter its duration. The agricultural claimant locates a homestead, while the prospector locates a claim. The former indicates permanency of tenure, while the latter suggests a temporary possession.

Intrinsic Value of Gas

Natural gas in the ground, or even in the field has little intrinsic value in or of itself. The surface owner cannot ordinarily take the gas to market. The gas becomes of value primarily only as service is performed on it in delivering the gas under satisfactory working conditions to the ultimate consumer.

The value of gas cannot be considered by itself, but must be considered with the leaseholds, wells, gathering lines, compressors, main lines and distributing systems, all of which must be properly co-ordinated to give the gas in the field any value whatsoever. Furthermore, in considering the value it would not be policy to consider a single individual case, but the property as a whole must be taken together.

The quality considerations that affect the value of a natural gas leasehold are the heating value and the purity, with regard to sulphur, moisture and oil. The quality is fixed by nature, and it is economically feasible to alter this. On April 13, 1915, the district court of Shawnee county, Kansas, set aside the order of the public utilities commission fixing a minimum heating value for natural gas. The decision has not been appealed.

There is absolutely nothing fixed from the surface, and while surface conditions may be indicative, the question of underground location can be established by the drill alone. Even the presence of gas sand is not necessarily an indication of the presence of gas. The supreme court of Indiana handed down a decision in which it was stated that it is judicially known as a matter of common knowledge, that gas or oil does not exist in paying quantities under all lands within the recognized districts, and there is no other generally acknowledged way than putting down a well to determine whether or not it does exist.

The rock pressure of individual wells is not necessarily indicative of the amount of gas that may be obtained from such wells. The open flow capacity of a well may be far from indicating the value of the well under routine operating conditions, since the actual line flow will always be less, and in many cases very much less than the open flow. If a well is located in a part of the field where it is not feasible to maintain low line pressure into which the well may discharge, obviously the flow will be less than if the well were located where low line pressure might be continuously maintained.

Various court decisions have recognized the migratory nature of oil and gas. Oil and gas, unlike coal, iron and other minerals, do not have a fixed situs under a particular portion of the surface, but are capable of flowing from place to place, and of being drawn off by wells penetrating their natural reservoir at any point. They are a part of the land, and belong to the owner so long as they are in it, or are subject to his control; but when they flow elsewhere, and are brought within the control of another by being drawn off by wells drilled in other land, the title of the former owner is gone. So, also, when one owner of the surface overlying the common reservoir exercised his right to extract them, the supply as to which other owners of the surface must exercise their rights, if at all, is proportionately diminished.

Possession of Natural Gas

It has also been decided in the courts that the owner of the surface has no property right in the gas or oil until he has actually reduced it to possession, or, if he has any property right therein, it is a right in common with the co-equal right of other land owners to take from the common source of supply, and therefore subject to the legislative power to prevent a destruction of the common property of one of the common owners.

Furthermore, petroleum gas and oil belong to the owners of the land, and are a part of it so long as they are on it, or subject to his control; but when they escape and go into other land, or come under another's control, the title of the former owner is gone. If an adjoining owner drills his own land and taps a deposit of oil or gas extending under his neighbor's field, so that it comes into his well, it becomes his property.

The only criterion of value that ought to be applied to gas leasehold valuation problems, is to consider the natural gas as an integral part of a public utility service.

Natural gas, although an ideal fuel for domestic service and manufacturing work, when used for industrial purposes must be sold at an absurdly low price in order to compete with coal and producer gas for industrial service. Although over 65 per cent of the natural gas used at the present time is used for industrial service, this industrial use has had the inevitable effect of curtailing very materially the supply for domestic consumption.

Domestic Consumers

On account of the exceptional value of natural gas for domestic service, every effort ought to be made to conserve the supply, so as to guarantee an adequate future, as well as an adequate present continuous service. It is doubtful whether anything does more for the prosperity, convenience, comfort and in many cases the health of a community, than the introduction and continued use of natural gas.

The present governmental tendency to prevent monopoly in the gas field, causes a decrease in the field of the leaseholds, and increases the cost of the gas to the public. Gas field operating conditions should be regarded as a natural monopoly, so that in the development of the field one company could space the wells properly, and drain the field only to its safe working capacity, thereby greatly increasing and strengthening the life of the field.

Competition in a gas field always results in a duplication of lines, unnecessary wells, enhanced operating cost, lack of proper co-ordination, failure to remove all the gas, and shortened life of the field with the inevitable resulting injury to the domestic consumer. The easier it is to drill a well in any given territory, the more wells will be drilled by small and inexperienced operators, and the greater will be the inefficient operation of the field. Furthermore, the indiscriminate drilling by inexperienced local operators always tends to increase the use of gas for manufacturing purposes, and takes the gas out at the fastest possible rate, thereby decreasing the effective life of the pool. Under competitive conditions, even where the underground gas reservoirs are made up of many local pools, various operators will drill

into the same local pool, and thus drain out the gas from under each other's leaseholds.

As competitive conditions decrease the life of the field, and in other ways affect its stability, competitive conditions obviously decrease the value of the leasehold. While competition decreases the value of the leaseholds, it increases the property value necessary in marketing the gas, by virtue of the large amount of development and inefficient operation, so that in the end the ultimate consumer pays more for his gas on a competitive basis than he would under conditions of regulated unified control.

The question of property is central and pivotal in modern distribution. Private property is the nourisher of mankind, the incentive to industry, and is the cement of society; it binds men together and is society's surest and firmest bond. In the United States we have been trained to regard property as a very holy thing. Here property in the modern sense represents the basis upon which our social order was established. One of the most cherished clauses in our constitution declares that private property shall not be taken for public use without fair compensation. It has been said that the power to demand rent on land does not depend upon the manner of obtaining it, but upon the possession alone. Modern economic society does not ask a property owner how he became possessed of his property. The fact of possession is sufficient to yield him an income. Our civilization has been erected upon the theory of the validity of effort. Reward provides the stimulus of effort. It is reward, or the hope of reward that inspires. Deny the reward of effort, and the well-spring of effort is dried up.

Natural Resources Starting Point of All Value

The fact that natural gas was made by nature has been responsible for many erroneous ideas regarding its worth. Few people appreciate that all raw material is natural, and is the gift of God to man, and that all production is carried forward upon the resources of nature by labor with the aid of capital. Every product of industry owes its origin to natural resources, the fields, the mountains, the water, some natural agent was the starting point for each material good on its way through the intricacies of the industrial system. Food, clothing, wealth in all its forms, is derived originally from nature.

The forces of nature, working through the ages, have created things which mankind needs. Human effort expended on these products of nature, converts them into forms that are usable. All usable wealth, no matter what its form, owes its value in the beginning to nature's gifts, and after that the process of production.

Present Fair Value is True Basis

The same legal doctrines that are used in valuing other utility properties ought to be applied to natural gas leaseholds. A long line of court decisions, from the United States Supreme Court down, establishes beyond question the doctrine that present fair value is the true basis. The crux of the whole matter is very aptly stated in the following typical water right case:

"The value to be considered is the present fair value at the time the rate is fixed. The original cost is not at all conclusive, if it can be shown that it now has a different value, although the original cost is, as in all cases, an element which may be considered. The present fair value should be determined by the best evidence of which the nature of the case is susceptible. It should be measured by the fair market value of a similar right in the locality, or a similar locality, if such can be established by satisfactory evidence."

When gas leases are valued they are to be valued as property within the meaning defined herein. To grasp clearly the distinction between value and cost is one of the first fundamental principles of valuation work. Very little reflection is needed to convince one that a thing may be worth much more than it cost, or that it may be worth much less. It may even be worth or valued much more at the present time than it cost, or it may be worth or valued at much less. In *"Forest Valuation,"* by H. H. Chapman it is stated that prices and values center upon the satisfaction of human needs in the present moment. The tendency is to avoid delay, and reduce as far as possible the period between effort and satisfaction.

The present moment is the basis for computing and comparing values. To every one the enjoyment of wealth in the present is valued more highly than at any future period. No one will undertake long-time investments unless he expects an increase in the value of his estate in a measure corresponding to and paralleling the accumulation of cost and interest.

In case a business changes hands by sale, the sale value so determined is accepted as the value of the business. In this transaction the price paid for the assets must be entered as their value on the books. Such sales thus establish a new recorded or book value for these assets. The fact of the sale is the most convincing evidence of value, although even this is not final proof, for one or the other of the parties may have been deceived or handicapped in the transaction. Nor will a past sale be accepted as absolutely determining a future sale even for the same property; in fact, it is usually the reason for desiring a different value. Sales of property or business have a profound effect upon proprietary accounts in that the former owner receives at once all his income and capital, and can balance his books and determine his net profit, while the purchase is saddled with a cost or investment which forms the opening entry in a similar account, and no future acts will serve to reduce this initial cost.

It is unnecessary to quote authorities to show that, in estimating the market value of land, everything which gives it intrinsic value is a proper element for consideration; not only its present use but its capabilities are to be considered.

Undeveloped Property Valued by Future Possibilities

The owner is entitled to the value of the property taken; that is, what it fairly may be believed a purchaser in fair market conditions would have given for it and not what a tribunal at a later date may think a purchaser would have been wise to give.

The sale of an undeveloped resource is predicated upon an advance estimate of its prospective value for purposes of development, and whatever the theory of division of its appraised value between the land owner and the operator, there will exist a certain element of risk which necessarily involves the possibility of dispropor-

Valuation of Natural Gas Rights

Natural gas plays an important part in the manufacture of steel and in the allied industries. The extent to which steel companies have engaged in the natural gas business is indicated by the report of the United States Steel Corporation for 1915 *which shows that subsidiary companies own or lease* 208,565 *acres of natural gas and oil territory; control* 805 *miles of pipe lines; operate nine pumping stations and own* 835 *gas wells. The annual production of natural gas is* 26,774,926,795 *cubic feet. The production of oil is* 60,057 *barrels. Practically all of the natural gas is consumed in the manufacturing plants of the subsidiary companies.*

tionate profit or loss to either party and which naturally will be discounted by both. We must recognize that the risk thus created becomes a legitimate if not absolutely necessary basis for an additional item of cost in operation, and therefore will tend to increase both cost and selling price; so that if at this point there is introduced the third party to all such transactions, namely, the ultimate consumer, we discover who pays the carrying charge of this risk. This added item of cost may appear in the preliminary financing in the form of a larger interest rate offered to the bondholder, or of a larger discount given to the underwriter, or of a larger dividend promised to the stockholder, or in all of these combined.

When is Public Served Best?

Natural gas has a heating value of from 50 to 100 per cent greater than manufactured gas, and is also non-poisonous as distinguished from the poisons in all manufactured gas and is therefore much safer, especially for domestic use. Natural gas can do everything that manufactured gas need do and many things that manufactured gas cannot do. In brief, man with all his skill has never been able to make a gas equal to that supplied by nature. Natural gas has usually been sold at prices far below the prices prevailing for manufactured gas, even without considering the increased worth of natural gas, due to its purity and much greater heating value, as against all manufactured gases. Therefore, every foot of gas that is found and served to the public represents a distinct economic gain to the community.

Natural gas can be found only by diligent prospecting. After it is found the service can be maintained continuously only by further continued development and persistent hunting for new supplies. In this development the prospector must figure on an average chance of getting one dry hole in every four wells drilled. Since the hazards are greater than in any other mining enterprise, the profits ought to be correspondingly greater. This element of profit is the only incentive which impels men to engage in so speculative an enterprise. If, in the aggregate, this amount of profit does not measure up to the hazards in the business the men will cease their work of prospecting and put their capital in safer enterprises. Wherever a close connection exists between effort and profit a strong resulting incentive is furnished for a further and continuous expenditure of effort. Therefore, a high rate of profit which will induce men to prospect continuously for natural gas brings about the condition that more people can use gas, and represents a distinct saving to the community.

Some of the problems of valuation are unsolvable on any definite mathematic basis. To solve the problem as to what is the value of property requires the most logical reasoning, involving legal, economic and technical science, and in addition to all, that very rare endowment known as common sense.

The ascertainment of value is not controled by artificial rules. It is not a matter of formulas, but there must be a reasonable judgment having its basis in a proper consideration of all relevant facts.

On account of the fugitive and migratory nature of natural gas, and since there is no regeneration, it is not possible to attempt to apply the reproduction method of valuation because it cannot be reasonably applied.

The well-known classification of leaseholds into producing, protective, reserve and prospective groups, will answer all practical valuation problems. Producing leases are those on which producing wells have been drilled and maintained. Protective leases are those which are contiguous to producing leases and which are held merely to protect the wells on the producing leases. Reserve leases are those which are held—usually after a certain amount of testing—as a reserve acreage to replace the depleting supply in the present producing wells. Prospective leases, sometimes called "wild-cat", are those which have not been tested or proven, but are held because the indications are that they may contain gas.

Unit Prices

In fixing the value of natural gas leaseholds it is not possible to establish a market price, as is the case in ordinary commercial commodities which are constantly changing ownership in the open market. The unit price per acre to be applied to the different classes of leases must be fixed by the judgment of men skilled and experienced in the natural gas business in accordance with the principles herein defined, as so well stated in the following water right case:

"If no market value can be established, then the opinion of competent witnesses as to the actual value may be considered. In this respect the case does not present any exceptional features. The same rule is applied in the case of any property, real or personal. The fair market value is the usual standard; but if it be shown that the property has no market value, then witnesses may testify to actual value, which is, of course, largely a matter of opinion. Because it is difficult to determine the exact value of a certain kind of property, it does not follow that the owner shall be refused the protection of the law. The fair present value of the right is the ultimate fact to be found and considered. Exactly what probative or evidentary facts shall be considered, or what standard of measurement shall be adopted in finding that ultimate fact, will depend largely upon the facts of each case as it arises."

Hardening High Speed Steel

The Vanadium-Alloys Steel Co., Pittsburgh, is distributing the following directions for hardening high speed steel·

When heating for forging, the tool should first be heated very slowly to medium red, after which the tool may be heated to a good forging heat and forged. Avoid hammering the steel after it cools below a good red.

When heating for hardening, preheat very slowly to about 1,500 degrees Fahr., and then bring up quickly to 2,250 degrees or 2,350 degrees Fahr., according to class of tool. The higher the heat, the better the tool. The steel should look perfectly white at the proper temperature. Quench in oil (or in melted lead). Draw the temper on lathe and similar tools to 950 degrees Fahr., or a visible red in the dark.

There is no difficulty in giving the steel the proper heat when hardening if care is used with the fire.

For lathe and planer tools, the best fire is one made of hard foundry coke in an ordinary blacksmith forge, with a few bricks laid over the top to form a hollow fire. The bricks should be thoroughly heated before the tools are hardened, and the points of the tools should be kept from contact with the fuel—this will prevent burning the edges of the tools.

Milling cutters and tools of similar character should be heated as hot as practicable, in view of the importance of preserving the cutting edges.

Electric and gas furnaces, designed for high heats, will do very satisfactory work in hardening this class of tools, especially those made for hardening high speed steel. Where a furnace is not convenient, these tools may be hardened in a forge fire, but care must be taken to keep the tool from contact with the fuel.

When cooling, high speed steel can be immediately quenched in oil, if intended for milling cutter, tap, die or similar tool. Draw the temper of this class of

tools to about 900 degrees Fahr. If it is a lathe or planer tool, the point can be cooled in oil and the tool finally cooled in a strong air blast, or if found necessary, oil not being available, the whole tool may be cooled in a strong air blast immediately after having the high heat, or it may be cooled in the open air. For many general purposes, it is found that where tools have been given the extreme high heat and properly quenched, the cutting qualities are improved and the steel extremely toughened if the temper is drawn to a very low red in the dark, and the tool permitted to cool.

Avoiding Scaling or Decarbonization

First—Remove all scale, and clean free from oil, grease, etc. Then while the tool is perfectly cold, immerse in water and while the tool is wet, roll in powdered boric acid.

Second—Place a piece of clean sheet iron in the bottom of the furnace so that the tool will not come in contact with the fire brick. Everything must be kept as free from foreign matter as possible.

Third—Preheat slowly to about 1,200 degrees Fahr., remove the tool from furnace at this heat and again roll in the powdered boric acid. This completely covers the tool with a coating of boric acid and protects the surface from any decarbonizing action of the air. Then, bring up quickly to 2,300 degrees Fahr., and cool in oil bath.

In classes of tools where it is advisable to draw the temper best results are obtained if the drawing temperature is 900 degrees Fahr., and the tool be permitted to cool in the open air.

The boric acid coating that remains can be removed by soaking a short while in fresh cold water. Great care should be taken that the tool is perfectly cold before being immersed in water to remove the boric acid, otherwise the tool may crack.

These instructions particularly apply to the hardening of milling cutters, twist drills, taps, dies, etc.

In many cases, a roughing tool, such as is used on a lathe or planer, will give greater service if heated to 2,300 degrees Fahr. and dipped in oil; then when cold, reheat or draw to 1,065 degrees and cool in the open air. Be sure these instructions are placed in the hands of the man in charge of your hardening room.

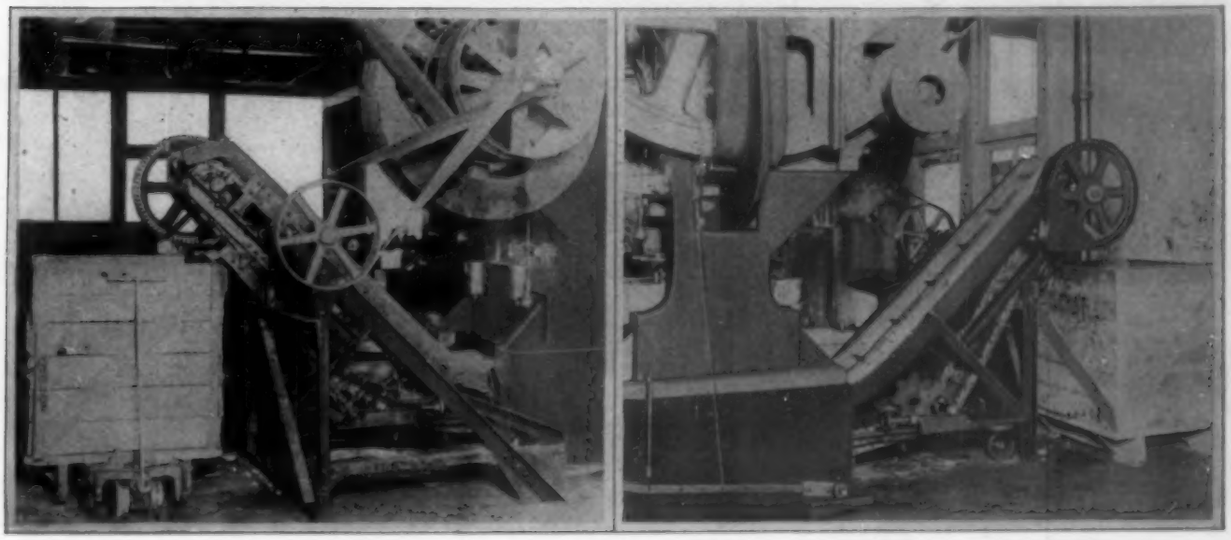
Conveyor for Handling Tank Heads

INSISTENT demands for increased output have given new significance, in recent years, to the problem of handling large numbers of small-sized products. This condition is particularly true in shops producing a standard article. The comparative inefficiency of and actual monetary loss incurred with manual labor assumes greater importance in shops making a standardized product, and it is natural that the greatest refinements in handling small parts by mechanical means are found in these plants.

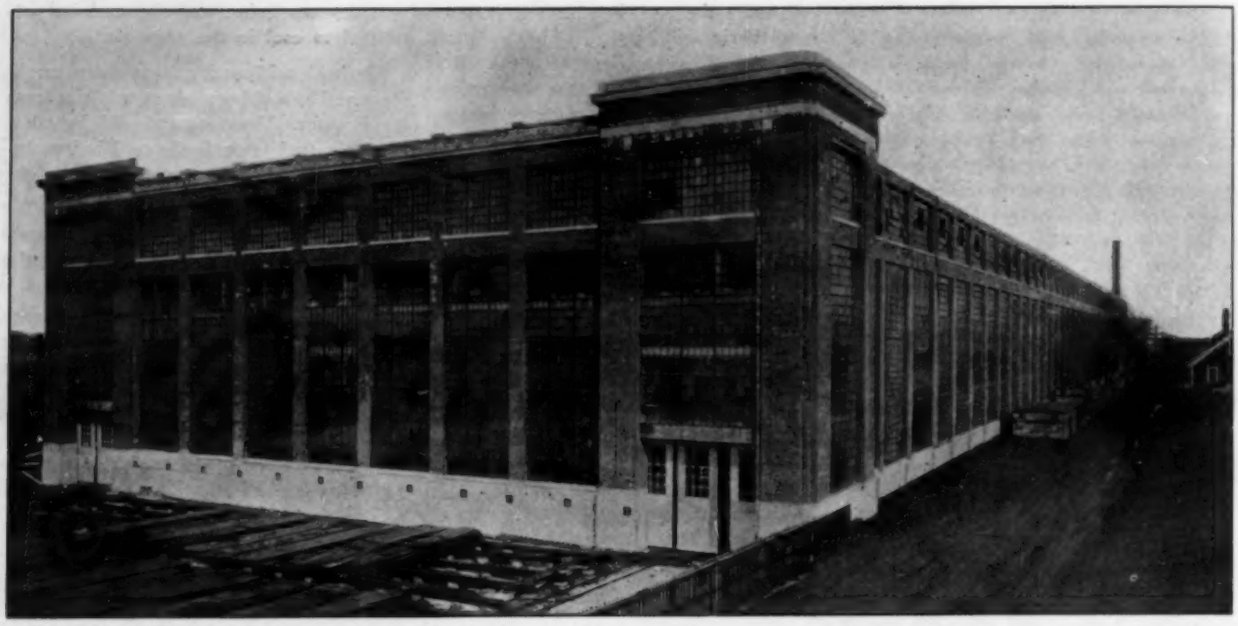
A recent adaptation of a mechanical conveyor in the shop of a large maker of automobile accessories, is shown in the accompanying illustration. The apparatus is an inclined conveyor manufactured by the Chain Belt Co., Milwaukee, Wis. The machine is placed under the discharge table of a press and is employed to convey pressed tank heads from the press to the delivery trucks. The saving in operating costs created by this method of conveying over that of manual labor is readily apparent.

The conveyor is simple in construction. It consists of a series of flat plates, which practically form a continuous apron mounted on two strands of chain. This chain is designed and constructed to give the greatest wearing surface and strength with minimum weight. The wearing surface is entirely on the cross bars of the chain and interlocking socket joints so that the main strains are placed on the links proper and not on the pins. Angle irons are attached to the flat plates at 16-inch intervals, so that the outstanding legs of the angle act as heeling pieces and prevent the tank heads from slipping back when on an incline. The chain is fitted with 2-inch diameter rollers and runs over 10-inch diameter cast iron sprocket wheels at the receiving and delivery ends of the conveyor. The chain is kept taut by sprocket wheels which engage with the return strands of the chain. These wheels are mounted on a shaft carried in bearings which are free to move in two directions in a stationary cast iron guide frame. The motion is effected by means of a steel screw projecting through one end of the frame.

The conveyor illustrated is driven by suitable pulley and gear reductions from the driving shaft of the press, the speed being arranged to synchronize with the capacity of the press. In this instance the conveyor travels between 50 and 60 feet per minute and delivers 1,500 tank heads per hour.



VIEWS OF CONVEYOR BUILT BY THE CHAIN BELT CO. AND USED FOR TRANSFER OF PRESSED TANK HEADS



NEW SHIP TOOL SHOP JUST COMPLETED BY FORE RIVER SHIP BUILDING CORPORATION, QUINCY, MASS.

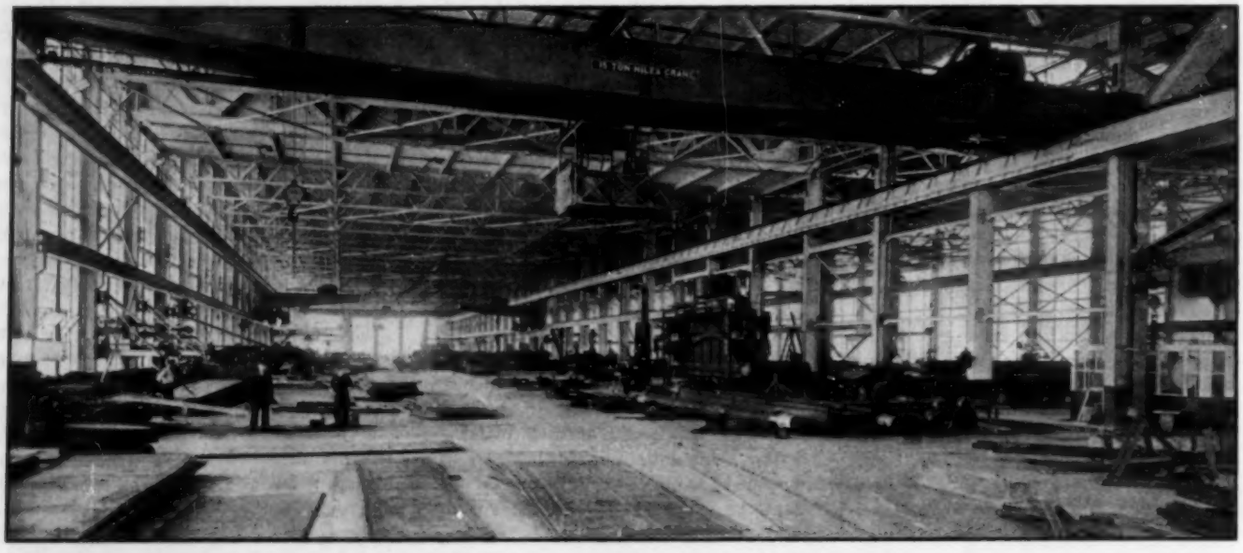
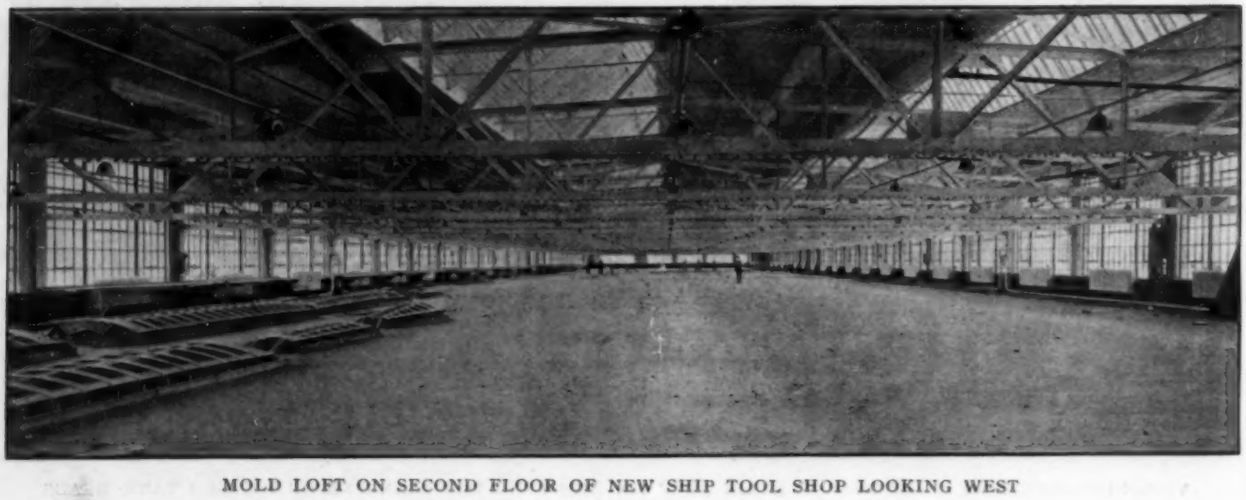


PLATE SIDE OF NEW SHIP TOOL SHOP LOOKING WEST



MOLD LOFT ON SECOND FLOOR OF NEW SHIP TOOL SHOP LOOKING WEST

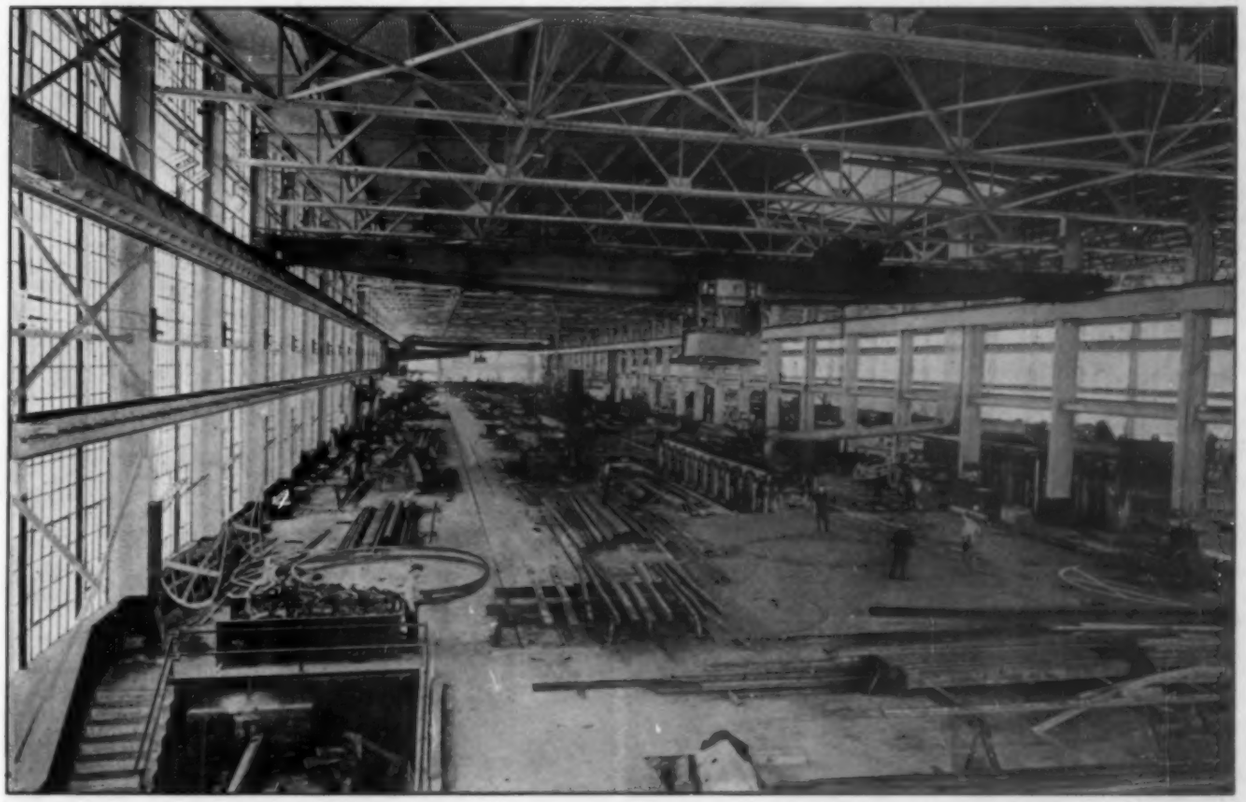
Large Ship Building Shop at Quincy

THE EUROPEAN war has served to give the American ship building industry an immense impetus during the last two years—Extensions to existing plants have been made freely, the Fore River Ship Building Corporation has just completed a building which is said to house largest plate and angle shop in the world

THE Fore River Ship Building Corporation, Quincy, Mass., has completed what is said to be the largest ship plate and angle shop in the world. The structure stands close to the slips for the big ships and is visible for miles. The space enclosed is so vast that the clamor of the machinery is subdued. The building, which is known as the ship tool shop, is 188 x 769 feet. It is 60 feet high and covers an area of 3¼ acres. It is floored with concrete and rock asphalt. The building is constructed of red brick with a steel frame; a maximum portion of the wall area is comprised of reflector glass, the center of the building thus being as well-lighted as any other portion. The building lies east and west and is served by a large stock material yard lying north and south at the western end. At the east end of the ship tool shop are located the building slip cranes which run north and south. The building is divided by a row of columns running east and west. The north portion is devoted to angles and beams, and the south side to plates. The material yard receives all the raw material for hull construction and is provided with railroad tracks and gantry cranes. The material is conveyed to the shops by electric storage trucks which may go through the shop from end to end and also under the building slip cranes at the east end.

The ship tool shop is fitted with machinery of the latest type. The plate portion of the shop is equipped with punches, with roller tables, a furnace, bending blocks, plate planers, large rolls, hydraulic plate bending and punching machines, scarfing machines, countersinking machines, and similar tools. It is served by 15-ton overhead cranes, and by wall, jib and post cranes. The angle side of the shop is fitted with a furnace, bending blocks, punches, planers and a hydraulic joggling press. This side is served also by overhead, wall, jib and post cranes. All machines in the shop are provided with independent electric drive and all are controled from a switchboard room. The building also is provided with hydraulic pumps and accumulators. The east end of the shop, which is equipped extensively with pneumatic riveters, is given over to the assembling and riveting of bulkheads and heavy material which are carried out to the building slip cranes which transfer them to their destination.

The second floor of the building, which is reached by elevators at each end, contains a mold loft and a sheet metal working shop. The mold loft is 93 x 605 feet with a storage ell containing 4,000 square feet. The loft is utilized for laying down ships to full size in order that templates may be made. The sheet-metal



ANGLE AND BEAM PORTION OF NEW SHIP TOOL SHOP LOOKING EAST

working shop is 93 x 164 feet with a 41 x 93-foot ell. This is served by electric monorail hoists and is equipped with sheet-metal working machinery of the latest type. Under the second floor, at each end of the building, are offices which are sustained by the floor trusses. The building also includes wash rooms, locker rooms and shower baths for the workmen.

Study Furnace Slag

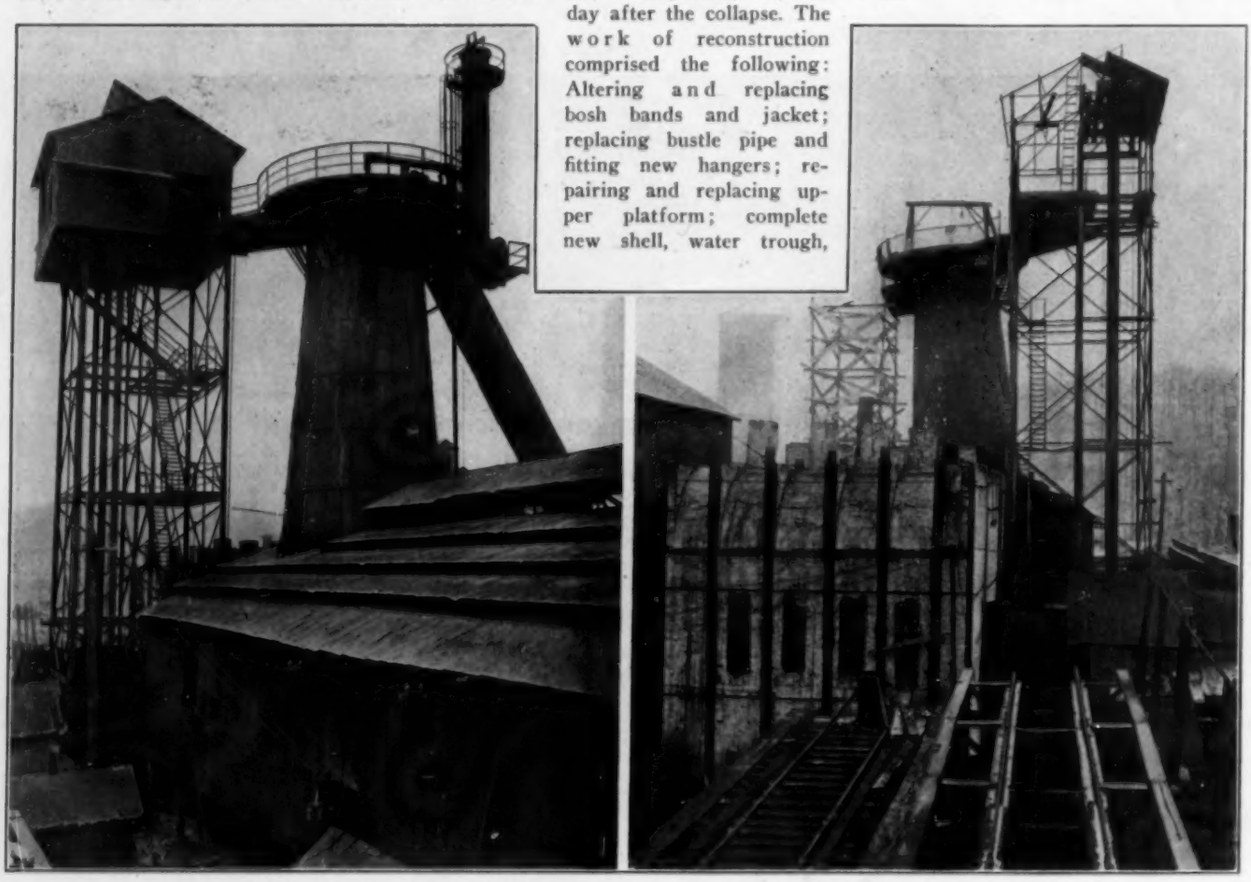
Advance information relative to the tests on the viscosity of blast furnace slags being made under the direction of the bureau of mines, indicates that the introductory work at the laboratory of the bureau at Pittsburgh, is progressing favorably. The experiments are being conducted for the purpose of studying the theory of metallurgical processes, with special reference to the variation in slag viscosity, the temperature, and composition of the slag, and its effect upon the distribution of the sulphur between the molten iron and the slag.

The temperature-viscosity curves obtained from the first series of tests show interesting facts in regard to the function of the slag in the blast furnace and give ample proof of the usefulness of the determination of viscosity from the practical standpoint. The shape of the curve cannot be determined by means of any single isolated measurement, such as melting point, softening point, or free-running temperature. In fact the physical melting point may correspond to a temperature at which the silicate mixture has all the external appearance of a solid, and in the case of such complex silicate mixtures as blast furnace slags, it has no obvious connection with the free-running temperature or viscosity. Moreover viscosity is a physical property which is very difficult to estimate even approximately by means of the eye.

It is expected that in the course of the experiments a relative and absolute fluidity test will be developed. From the studies of numerous types of slags, tables are to be constructed enabling a blast furnace operator to predict with some accuracy the action of the slag in the furnace. The tables would help determine combinations of bases and acids possessing the most desirable fluidity, would indicate the heat increment necessary to confer fluidity in refractory slags for the diffusion of sulphides and the elimination of sulphur.

Rebuilding a Blast Furnace in 50 Days

THE accompanying illustrations show the Alice furnace of the Valley Mould & Iron Co., Sharpsville, Pa., before and after its recent reconstruction. This stack collapsed on Saturday, Dec. 12, 1915, and the illustration at the right shows the condition of the wrecked furnace. The stack was rebuilt in the remarkably quick time of 50 days, the view at the left showing the furnace just before blowing in on Jan. 31. The contract for the reconstruction was awarded to the William B. Pollock Co., Youngstown, O., one day after the collapse. The work of reconstruction comprised the following: Altering and replacing bosh bands and jacket; replacing bustle pipe and fitting new hangers; repairing and replacing upper platform; complete new shell, water trough, mantle, hanging bell, hopper and top rigging, bleeder, downcomer and dust catcher. A new platform was also built to the stack, new boilers were installed and new gas mains put in place. A new stove platform also was built.



ALICE FURNACE AT SHARPSVILLE WHICH WAS REBUILT IN 50 DAYS

Process of Making Washed Metal

THE WASHING process has been in the stage of development for forty years but at present only one firm in the United States is using it. In this article the operation of the plant and the results obtained are discussed—A description of the Pernot furnace which is used by the Brier Hill Steel Co. is given

BY HENRY D. HIBBARD

THE process of making washed metal now followed is in principle that described by Holley in 1879, as the Krupp washing process. Sir Lowthian Bell also experimented extensively in England during 1877 and 1878 on refining iron and joined his interest with Krupp, the process being often referred to as the Bell-Krupp process. The only plant in this country now operating this process is that of the Brier Hill Steel Co., Youngstown, O. This process may be considered as the sole survivor of the numerous methods conceived for refining crude iron, when the removal of phosphorus from steel-making material was the great desideratum affecting large districts. The east coast of England and all northern Germany, the homes of Bell and Krupp, respectively, could at that time make steel only from imported ores. These processes were in use or in various stages of development 40 years ago and all except the Bell-Krupp received their quietus from the development of the basic steel processes, both pneumatic and open hearth. The aim of the early refining processes was, first, the removal of the silicon, which could be done on a sand bottom, and later, the removal of the phosphorus, requiring a bottom which would give or permit a basic slag. The incidental advantages of increased yield and small fuel consumption were not generally recognized or considered; the aim of the later operations was the saving of the difference in value between low and high phosphorus irons, as well as hastening the removal of the metalloids.

Chemistry of Washing Resembles Puddling

The chemistry of the washing process follows in part that of the puddling process, and indeed washing might be considered as the first half of puddling, since all the non-ferrous elements of the crude iron, except the carbon, are eliminated and the iron is maintained molten until cast. In puddling, the iron loses its carbon as well, and because of that its fusion point rises above the hearth temperature; it freezes into a pasty malleable form, and is worked at once by the squeezer, hammer or rolling method. Since Holley's paper, important improvements have been made from time to time in both plants and methods for washing iron, and the degree of purification attained is far greater than Krupp accomplished, particularly as to phosphorus, though Bell's results approximated those of the present practice. The costs have been diminished as well.

Application of Washed Metal

The use of washed metal is limited. It is in request now only as an exceedingly pure iron and is used, first, in acid steel processes, solely for the reason of its purity, as in open-hearth and bessemer steels of high grade; and, second, because of its high carbon content, varying from 3.25 to 3.50 per cent, as well as purity, as a carburizer in crucible steel.

In this paper on the subject of washed metal Mr. Hibbard describes the general method of washing from an operating viewpoint. His article has brought forth a discussion as to the practical value of the Bell-Krupp idea of crude iron refinement. In this connection it is interesting to note the opinions set forth by Mr. Ford in his article on the removal of metalloids in the pig washing process. It is noticeable that the conclusions of both writers in regard to the chemical changes occurring during the process correspond in important details. The strictly chemical discussion of Mr. Ford is a valuable supplement to the more general treatise written by Mr. Hibbard.

The washing plant of the Brier Hill Steel Co., Fig. 1, is placed near one of its blast furnaces, which supplies it with molten crude iron. It consists briefly of a reservoir, a Pernot furnace, a reheating furnace and a casting machine. The reservoir is about 100 feet or more from the blast furnace, a runner in the floor of the cast house conducting the stream of molten crude iron to it from the furnace. It has a brick lining 18 inches thick, is of 50 tons capacity, and is mounted on top of the ram of a vertical hydraulic cylinder, which straddles a 100-ton weighing scales. It is provided with mechanism for tilting to pour the metal. Fifty tons of iron make four washed-metal charges, which take about one hour each to work, and, since the blast furnace is tapped every four hours, the reservoir provides a continuous supply of iron to the washing plant. The reservoir receives iron when at its lowest position, is raised by the hydraulic plunger about 15 feet, and discharges to a short open runner which conducts the molten crude iron to the Pernot furnace. Iron has been held molten in the reservoir 48 hours with the help of a small oil jet, and then washed without difficulty.

The Pernot furnace in which the washing is done differs in many details from the Pernot furnaces which have been described. In fact, nothing of of the original furnace remains and hardly any of the details of the original design, though the general plan is the same. The changes made have resulted in greater durability and efficiency, but even now the cost of repairs is an important item in spite of the relatively low temperature of the operation. This furnace is shown in Fig. 2, page 278.

The pan, as the circular hearth is termed, was originally designed to revolve on wheels, but now runs on conical rollers, which are kept spaced by a spider. The rollers travel on a circular track below the pan, turning in the same direction as the hearth, but at half the speed. On the bottom of the pan is a circular track on which it travels over the rollers. The pan is driven by a bevel pinion engaging a gear on the bottom of the pan. The pan lining is only 8 inches thick and water is continuously sprayed upon the bottom, from underneath, to keep it cool.

Plan of Superstructure

In the superstructure, at one side of the single operating door on the charging side and above the pan, is an opening with which the crude iron runner from the reservoir is connected and through which the molten iron is charged into the furnace. In the side of the pan near the bottom is a tap hole and near the top a slag notch. A hole through the furnace roof connects with an ore chute through which the ore is shot for

fettling the hearth after each charge has been drawn off.

One circular gas producer supplies gas for the use of the furnace. The ability of a single producer to run this plant, depends on the fact that the coal used contains only about 1.5 per cent ash, with 44 to 46 per cent of volatile matter, and will not coke under any circumstances. This makes it possible to carry a fire 8 feet or more deep, and drive at a high rate with a steam injector for the air, without having above 2 per cent CO_2 in the gas. This coal in earlier days was used raw in the blast furnaces of the neighborhood without other fuel for making pig iron and is in this respect like the famous Scotch coals.

with ore thrown by the shovelful through the operating door. The ore used for bottom making and fettling is a high-grade specular hematite, broken into pieces from the size of a hen's egg down, with enough fine ore to make a compact mass without voids. Between 20 and 30 minutes are consumed in repairing the bottom and fettling. The tap hole and cinder notch are cleaned out and plugged with sand.

The firing is then resumed to heat and set the fix, the reservoir is raised and 12 tons of iron is run into the pan, which is then started revolving. A reaction immediately takes place between the oxygen of the ore and the silicon, phosphorus and manganese of the iron, the bulk of these elements being eliminated in a few minutes, by passing into the slag which is formed. The small percentage of carbon which goes off during the operation makes enough CO gas to give a vigorous boiling action, throwing jets of slag 3 to 5 inches above the bath at first when the temperature of the bath is greatest.

iron and are therefore smelted afterward in the blast furnaces for making basic pig.

Tests are taken from time to time, averaging about five to a heat, to determine the degree of dephosphorization. The test is a circular cake about 5 inches in diameter and 1.25 inches thick in the center, being thinner at the edges. This cake is broken into pieces. The test contains a myriad of small bubbles and has a faint crystalline or columnar structure normal to the bottom surface. The lower the phosphorus the larger the bubbles, and the fainter the crystalline structure mentioned. With very low phosphorus, bubbles as large as 1/16 inch in diameter may be found within ¼ inch of the lower surface, with smaller ones still lower and larger ones up to ¼ inch in diameter near the upper surface.

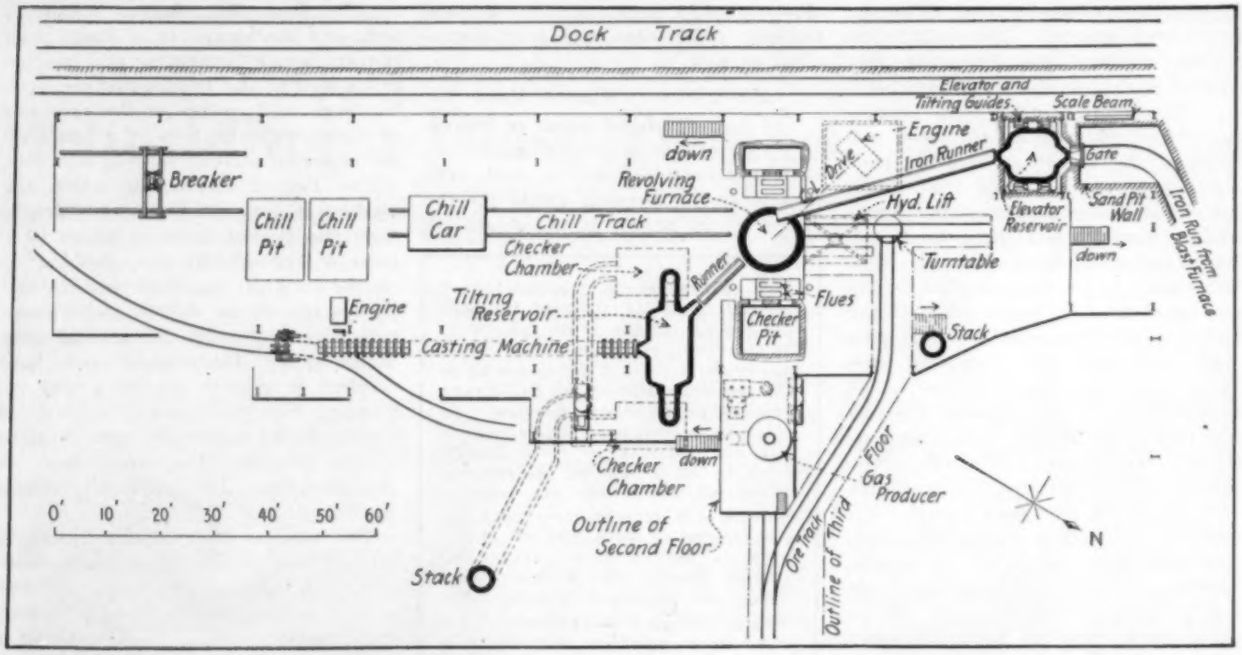


FIG. 1—WASHED METAL PLANT OF BRIER HILL STEEL CO.

A section of the floor, 10 x 10 feet, on the charging side of the furnace is arranged to be lowered, which is done after each heat is run out, providing a place for the men to stand to repair the tap hole and cinder notch, the pan being revolved so that these openings are on the high side.

After a heat has been run out, the furnace is drained; any holes in the hearth are puddled out and filled with iron ore, and the fettling, consisting of dampened ore, is run down in successive batches through the roof, the hearth being revolved a little at each dose, so that the bank of fettling is continuous around the hearth. The gate of the ore chute above is controled by the melter from the working platform by means of overhead levers. While the banks are thus being built up, the bottom is covered

About 15 minutes after the crude iron has been charged the slag is made to run off through the slag notch. This slag contains most of the oxidized silicon, phosphorus and manganese from the crude iron, and perhaps a quarter of the sulphur. A second slag is then formed by additions of lime, which, with the ore melted from the fettling, takes up more of the phosphorus and sulphur of the iron. These slags are rich in

The whole washing operation takes about an hour, the most of this time being consumed in securing the extremely low phosphorus content required. When ready for casting, the tap hole is turned to the proper position on the pit side of the furnace and is then dug open by means of a hand bar.

The metal runs from the furnace fairly well, but looks cool, almost of an orange temperature, perhaps not over 1,250 degrees Cent. It gives off copious brown fumes, as well as scintillating sparks and CO gas, which burns, the whole making a brilliant effect and, when viewed from a distance, gives one the impression that

the metal is much hotter than it really is. For casting the metal two means are provided. The one generally used when the product is for domestic consumption is a broad shallow cast-iron pan on a car, which runs on a track leading from the Pernot furnace down the center of the cast house. The charge is run out into this pan, where it forms a single plate from 4 to 6 inches thick, and the car is then drawn away from the furnace to cool. Water from a hose is played upon this plate for a few minutes, while hot, to loosen any slag which may come out after the metal and is not trapped off while casting. When the cake of metal is cool enough to be moved without breaking, but is still red hot, it is lifted from the car with a crane and put in a pit. Water is then turned on and it is flooded until cold enough to handle, when it is broken up into one-man size chunks, either with a sledge or by a traveling breaker. This is not difficult, because the water cooling has filled it with cracks, which go clear through the plate. These cracks seem to have no system, except that they are always at right angles to the upper and lower surfaces of the plates, leaving the pieces very irregular in outline.

Casting for Foreign Shipment

The other casting method, usually employed for export orders, is to run the washed metal without the slag into a 12-ton tilting, oil-fired regenerative furnace, located at a lower level, where it is held about 15 minutes, heated and poured directly into the molds of an endless-chain casting machine, which moves at the rate of about 15 feet per minute. The joints between the tilting hearth and the stationary ends of the reheatinng furnace are packed with asbestos, which closes them tightly and will endure the moderate temperature, say 1,350 degrees Cent., fairly well.

Analysis of Crude Iron

The metal is a little hotter than when it left the Pernot furnace, but is still of an orange heat. In the molds the metal is puffed up by gases being evolved, but settles more solidly soon after being cast, leaving a fin standing up all around each pig. For casting into this form, an extra charge is made.

The yield of washed metal is about the same as the weight of the original crude iron charged.

The crude iron contains: Silicon, 1 to 1.25 per cent; sulphur, 0.02 to 0.03 per cent and phosphorus, 0.09 to 0.10 per cent. All of the silicon and manganese, 90 to 95 per cent of the phosphorus and 30 per cent of the sulphur are eliminated. The silicon and manganese with 75 to 80 per cent of the phosphorus leave the iron in 10 minutes and 30 per cent of the sulphur in 15 minutes. The silicon, manganese and phosphorus are removed by oxidation, while the sulphur seems to be eliminated by liquation, the sulphide of iron getting into the slag mechanically without oxidation. At certain high temperatures, the affinity of sulphur for oxygen seems to be weaker than its affinity for iron. The slag takes sulphide of iron from the metal until the equilibrium is established between the proportions of sulphide in the two when no more will pass. When a second slag is formed some of the sulphide will enter that, making the elimination from the metal more complete. Should the slag have too much sulphide, as has happened when some blast furnace slag got in with the crude iron, some of the sulphide will pass from the slag into the metal, and in that way establish the equilibrium.

Individual heats of washed metal have been made having as little as 0.002 and even 0.001 per cent of phosphorus, and it has been furnished on specification of 0.006 phosphorus and under.

When iron heavily charged with carbon, like washed metal, lies molten in contact with molten oxide of iron, there will be, if the heat is high enough, a continuous oxidation of carbon to CO until the temperature falls to a certain degree, when the action will cease. That reaction is endothermic and the consumption of heat automatically brings the temperature down to that point. This temperature has not been determined, but there is ground for suspecting it to be near 1,300 degrees Cent.

Analyses of Metals and Slags

Typical analyses of crude irons with washed metals and slags therefrom are as follows:

	Pig Iron, Per cent.	Washed Metal, Per cent.
Silicon	1.25	none
Phosphorus	0.095	0.010
Sulphur	0.020	0.015
Manganese	.....	none
Combined carbon	.....	3.40

Final Slags

	Per cent.
SiO_2	16.50
MnO	6.50
CaO	8.50
P_2O_5	1.05
S	0.075
FeO	50.25
Fe_2O_3	16.90
	99.775

The Removal of Metalloids in Washing

BY EDWARD L. FORD

IN Fig. 3, which shows the removal per cent of metalloids in washing, the rate of elimination of each seems to be constant for about the first 10 minutes and, with the possible exception of sulphur, the angle which the line of each makes with the base line probably represents the relative net heat results of each complete reaction. I use the word *complete* because the net result is the sum of a number of things: In the case of silicon, for example, the heat + or — from Si to SiO_2; from FeO to Fe; from Fe_2O_3 to FeO; the formation of silicate by the silica; the liquefying of this silicate, and similar chemical reactions. Why these rates should not remain constant up to complete elimination is due to changes in temperature, changes in character of atmosphere, changes in composition of slag and resultant metal, and very possibly other causes. We have worked out some of these, and, although they may not be the only factors, they seem to explain fairly well what happens.

The rate of silicon removal is constant to about 95 per cent when it begins to become less rapid. This, I think, is due entirely to the want of perfect mobility of the slag and metal, and therefore to the fact that the silicon is not present in equal amounts in all parts of the metal at this stage of the process. In fact, it must take an appreciable amount of time for the metal in the center of the mass to reach iron oxides on its surface.

Manganese seems to behave in the same way, although the rate of removal is a little less rapid. Its retardation at the end is due to the same causes.

The phosphorus removal rate is constant to about 70 to 75 per cent, when retardation sets in, and progressively increases, the line tending to parallel rather than intersect the 100 per cent line. The long time required to remove phosphorus, as compared with silicon and manganese, would make the lack of mobility at this stage a factor of practically no consequence;

This discussion was presented at a recent New York meeting of the American Institute of Mining Engineers by Edward L. Ford, Youngstown, O.

FIG. 2—FRONT VIEW OF WASHING FURNACE SHOWING TIPPING RECEIVER FOR HOLDING WASHED METAL WHILE CASTING IN MACHINE ON RIGHT

but, after the elimination of silicon, carbonic oxide begins to be formed; and, as Pourcel showed very clearly, in the early days of the basic bessemer process, in the discussion on the necessity for the overblow to remove the phosphorus, phosphorus cannot be removed from iron when CO is being formed intermolecularly in quantity; and no doubt the proportion of phosphorus removed is inversely related to the amount of CO formed during a given period. True, the formation of CO, by lowering the temperature of the bath, tends to stop itself; but it completely ceases only when the metal is so cool that it begins to set; and this, of course, impairs the fluidity necessary to bring new surfaces of metal in contact with the slag, in order to oxidize the small amount of phosphorus left. We, therefore, finally reach a point of equilibrium when the CO formed just reduces the amount of phosphorus oxidized. If we increase the heat of the furnace, to increase the fluidity of the metal, we increase again the amount of CO that can form, and so are no better off.

Our theory of the elimination of sulphur I have never seen formulated and would hesitate to report it here, if I were not trying to give the rationale of the washing process, as we have known it. Even at quite a low temperature, sulphur appears to form sulphides, preferably to oxygen compounds; and as the temperature increases, this tendency seems more marked. In neither the blast furnace the converter, the open hearth, the puddling furnace, nor in our washing process, is the sulphur removed, except as a sulphide. In roasting sulphurous iron ores, however, it does go off as SO_2; but this process, as is well known, is performed at as low a temperature as possible. Our view is that for any given temperature, atmosphere, slag and metal composition, the amount of sulphide in the slag bears a constant ratio to the amount in the metal. That there is an equilibrium, so to speak, which cannot be altered without a change in one, at least, of the controling factors above mentioned. In our own process, as carried out by us, the ratio seems to be one in the metal to five in the slag, or, to put it another way, a slag with 0.10 per cent sulphur will give a metal with 0.02, and to get 0.01 per cent sulphur in the metal, the slag must not have more than 0.05 per cent. As corroborating this proposition, the two following incidents may be interesting:

On one occasion, pig iron with 0.025 per cent sulphur was run into the washing furnace at a time when an accident at the blast furnace had let some blast-furnace cinder get into the receiver together with the pig metal. Some of this cinder ran with the metal into the washing furnace. The resulting washed metal carried 0.04 per cent sulphur. With our ordinary practice this would have been about 0.017 per cent.

Some washed metal with 0.015 per cent sulphur was melted in a cupola with coke. The resultant metal ran 0.10 per cent sulphur. Some white iron with 0.10 per cent sulphur was melted in the same cupola resulting in 0.11 per cent sulphur. We had on our yard a heat of washed metal containing 0.09 per cent sulphur. This was melted in the same cupola with the result, sulphur, 0.12 per cent. These results seemed to point to from 0.10 to 0.12 per cent as the equilibrium point in the resultant metal from these operations, no matter what sulphur the metal contained at the start.

The sulphur line tends to become tangent always directly below the point of complete silicon elimination, because at this time the formation of new sulphur-free slag, capable of taking up more sulphur from the metal, ends. The percentage removal, therefore, varies with the sulphur contents of the iron, in contradistinction to the other metalloids, the percentage removal of which is constant.

If the other conditions incident to the process permitted it, we could, by making new slags, reduce any amount of sulphur in the pig to about 0.01 per cent, but we could never get much lower than that, no matter how low the pig was, as long as our slag-making materials were as high in sulphur as they are now. Our experience teaches us, however, that the blast furnace is the best and cheapest desulphurizer.

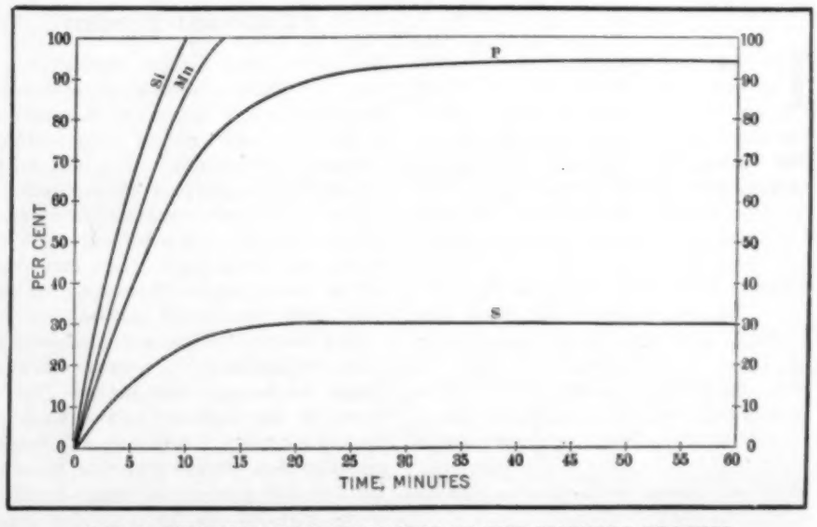


FIG. 3—REMOVAL OF METALLOIDS IN THE WASHING PROCESS

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Deep Etching for Marking Steel Bars

Please give us directions for marking a large number of steel bars. The kind of marking desired is a deep etching similar to the impression made by a steel stamp on softer metal than tool steel.

The deep etching of steel may be done with a solution made up of one part of nitric acid, one part of hydrochloric acid, and 10 parts of water. The design to be etched should be marked on the steel with etching varnish so as to leave exposed only the surfaces to be eaten away. Prepare a rubber stamp in reverse to the ordinary printing stamp. This requires that the stamp have a flat surface with the outline of the letters sunken or depressed below the surface. The etcher's varnish may be bought. It is usually made of resin, lard oil and lamp black, and it has the consistency of stiff vaseline. It is applied to the stamp by a rubber roller.

Apply the etching fluid to the steel with a glass brush. It should be understood that any deep etching will make the outline of the letters ragged, as the metal will be eaten away under the surface. After etching, neutralize the work with a hot alkaline solution and apply a little heavy oil or grease to the letters.

Monel Metal

What is monel metal? For what purposes is it used? Where is it found, and what does it cost?

Monel metal is a natural alloy of approximately 67 per cent nickel, 28 per cent copper and 5 per cent other metals, and contains no zinc, tin or antimony. It has been found adaptable for a great many uses, including valve parts; marine condenser parts, such as tubes, ferrules, etc.; parts of submarine torpedoes and of ordnance; pickling tanks; pickling pans and crates; ball bearings, and automobile fittings. The mines from which the ore is obtained are located in Ontario, Canada, and are owned and operated by the Canadian Copper Co., a subsidiary of the International Nickel Co., and said to be the sole refiner of monel metal. Monel metal is listed in the following manufactured forms: Rods, including rounds, squares, hexagons, rectangles and half ovals; castings, forgings, wire, wire cloth, wire rope, ball bearings, strip stock, tubes, sheets, bolts and nuts, lag screws, screws, tie rods, washers, nails and rivets, chain, golf club heads. It is quoted as follows in cents: Rods, base, Pittsburgh, 35.00; cast, Pittsburgh, 45.00.

Preparing Samples for the Microscope

Will you outline the general method of preparing specimens for microscopic examinations?

The appearance of fractures of rough surfaces may be superficially examined with magnifying glasses of low powers, but where high power microscopes are used—150 to 300 diameters—it is necessary to have a plane surface as free from scratches as possible. It is possible to secure such a surface by applying various abrasives of successive degrees of fineness until the proper surface is secured.

There are certain constituents which are revealed by polishing alone (for example, manganese sulphide) particularly where some of the components are softer than others, and, by using a relatively soft support for the abrasive, the softer constituents are worn away to a greater depth than the others, leaving them in relief. Samples are also prepared for examination by treating with certain reagents which color some of the constituents, not affecting others. This method is commonly known as etching and has a number of practical uses in the metallurgical field.

Production of Seamless Tubing

Can you tell me briefly the details of the Kellogg process for making seamless tubing?

A number of the important details of the Kellogg process for the manufacture of seamless tubing are kept secret. This process consists primarily of casting an ingot with a hollow center. This ingot is then placed over a mandrel and rolled until the wall is of the desired thickness.

Testing Pipes and Tubes

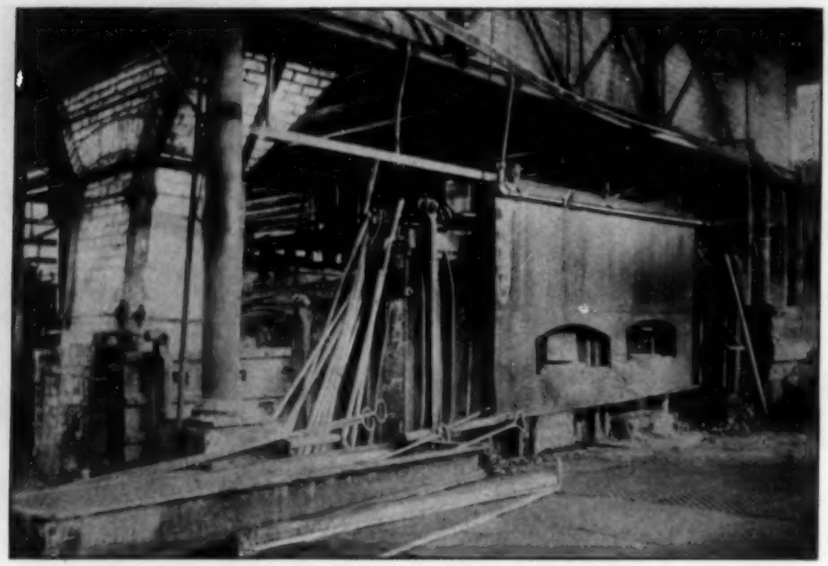
How are pipes and tubes tested?

Finished seamless tubes are tested principally under hydraulic pressure. By this method all leaks and defects are readily discovered. Tubes which fail to pass this test are known as blowers or leakers. Lap welded tubing which fails in this test and which has dirt in the weld is known as a sand blower. Lap welded tubes having longitudinal cracks are known as iron blowers.

Power of the Speaker

In a magazine published in New York, I recently saw a statement that the legislative committees of the house of representatives are appointed by the speaker, and in the senate, by caucus of the majority party. It also stated that the speaker of the house has much greater power than the president of the senate and is himself chairman of the rules committee. Are these statements correct?

The magazine to which you refer is in error. The plan which it described prevailed under the speakership of Mr. Cannon and for many preceding years, but the present system, established in 1911, is very different. The majority of the ways and means committee makes up the majority slate for all committees just before each session convenes. The



FURNACE EQUIPPED WITH WATER CURTAIN

chairman of this committee automatically becomes majority leader. The speaker of the house is chosen by party caucus, and the minority leader is also chosen by party caucus, but, unlike the majority procedure, the caucus of the minority party makes up the entire slate of minority committeemen. This slate is submitted to the majority of the ways and means committee for its approval and has been accepted invariably. The speaker of the house is not chairman of the powerful committee on rules. The present chairman of that committee is Robert L. Henry, of Texas. The speaker of the house is a member of that body, while the president of the senate is not a member of the latter body, but is vice president of the United States and does not have floor privileges such as the speaker of the house enjoys. The speaker can vote or talk on any legislation, while the president of the senate can vote only in the event of a tie.

Protecting Workmen From Heat

By W. S. Standiford

Increased comfort to the workmen and consequently higher production have followed the use by one rolling mill of a device for shielding the furnace men from the intense heat radiated from the heating furnaces. The device is called a "water curtain" and is intended for use in summer only, when workmen feel the heat the most.

The water curtain, as shown in the accompanying illustration, consists of a rectangular steel sheet screen suspended from three door hangers placed on an iron track above the front of the furnace. Water is prevented from flowing into the furnace by angle irons on the two charging doors shown in the illustration.. A spray pipe is located along the top, water flowing through small holes in this pipe against the side of the curtain. The spray pipe is capped at one end and connected to the water supply at the other. The streams of water, running down the sides of the curtain, keep it cool. Waste water is led off through a pipe into a trough at the side of the furnace.

In winter, the curtain is easily removed by disconnecting the supply pipe and lifting the apparatus off the trolleytrack.

The organization of Arthur D. Little, Inc., has been retained by the Canadian Pacific Railway Co.

Magnets on Lake Boat to Handle Iron

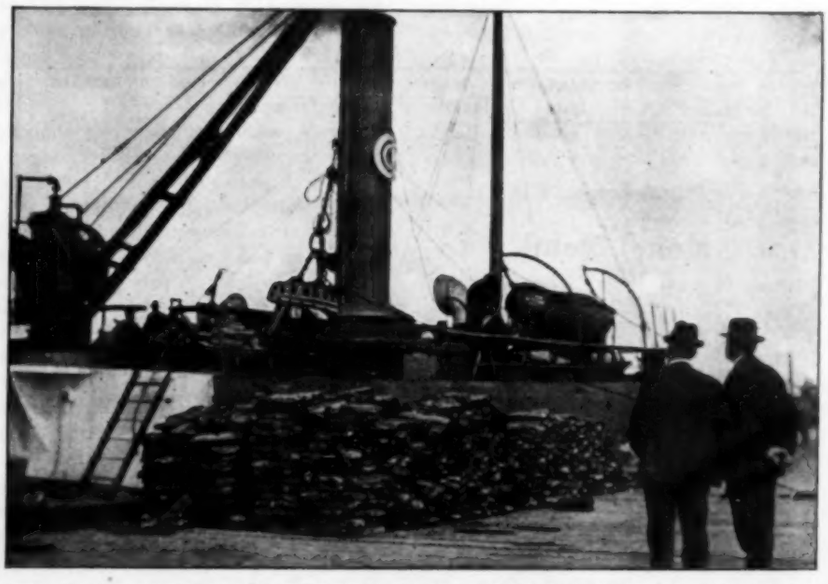
The lake freighter CICOA is now employing electric lifting magnets to handle its cargoes of pig iron. The application of magnets to this purpose marks an interesting advance in freight handling methods as it is the first time that pig iron has been handled by a ship's own equipment of magnets. The accompanying illustration shows the magnets handling their first load.

The use of the magnets dispenses with the services of the usual gang of longshoremen. It is stated that the loading cost of the first cargo of 2,000 tons of pig iron was only $100 with the magnets, whereas the employment of longshoremen would have cost from $500 to $600.

The magnet equipment comprises three 36-inch circular magnets furnished by the Cutler-Hammer Clutch Co., Milwaukee. One man operates each magnet, a fourth attendant being employed for taking care of the generator. With all three magnets working, the net weight of pig iron lifted from the dock is 4,500 pounds.

Lifting magnets have previously been installed on docks for handling pig iron in and out of vessels. Two Cutler-Hammer magnets were installed on the dock of the Inland Steel Co., Indiana Harbor, Ind., in 1910 and unloaded 2,000 tons of pig iron from the freighter ERWIN L. FISHER in 10½ hours.

The freighter CICOA is owned by the Charcoal Iron Co. of America, Detroit. She will be employed exclusively in carrying pig iron from the company's Lake Superior and Lake Michigan docks to Buffalo.



LIFTING MAGNET LOADING PIG IRON ON STEAMER CICOA AT ASHLAND, WIS.

British View of the Great War

With Special Reference to Effects on Iron and Steel—Tremendous Demand for Materials Expected to Follow Declaration of Peace

Bureau of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., July 25.

NO PREVIOUS war has so affected the iron and steel trades, for the reason that this has been more than the outsider, and, possibly, even the insider, ever dreamed, a steel war. In this respect, the Britisher was handicapped. For many years, British output has been at a standstill, while German trade has grown. This has been largely because of the heavy British purchases at low prices of foreign, especially German and Belgian, steel. British steelmakers felt there was not sufficient encouragement to increase their plants, so long as foreigners could undersell them by means of cheap labor, and with the aid of bounties, etc. When the war broke out, a vast demand for steel sprang up, and enlargements at once became necessary. The extent of these has not yet been tabulated; when the end of the war reveals it, the country and, possibly, our enemies, will be surprised. In this respect Germans have done themselves an ill turn, by dragging us into war.

Germany, however, was smart in her initial move, which placed in her hands the French steelmaking district, and the very important iron and steel trade of Belgium, which includes some of the finest establishments of the world. She had the whip hand, in having, also, under her control the tungsten supplies, essential, of course, to the production of high-speed steel. That this problem has been solved by this country is highly creditable to all concerned. Spelter also ran up to four or five times its normal figure, and the discovery was made that the supplies of this and other highly useful metals coming from our colonies were almost wholly under German control. That handicap has already been remedied, largely through the vigorous action initiated by the Australian premier, Mr. Hughes. Here again, Germany will find herself in a very different position after the war. She will, in fact, have to pay dearly for the frankness with which she threw off the mask, and disclosed the sinister character of a great portion of her trade in metals. Zinc, of course, like copper, has a very intimate relation with the production of many kinds of war material.

The necessity to create a Kitchener army affected the steel trade unfavorably. Many skilled men are in the field, or have already laid down their lives, who could have served their country better at the furnace and mills. This was not realized until the mischief was largely done. Clearly, the shopmen and clerks gathered in by the final act of conscription ought to have gone first to the war, because their work was not vitally necessary to the military program. On the other hand, they could be better replaced by female labor, the steel trade being preeminently unsuitable for women. There is not much doubt that one result of the war will be an enormously enlarged recognition by the government of the day, of whatever party, of the importance to the nation of the iron and steel trades.

Naturally, the early seizure of the French ironmaking area by the Germans, and the fact that Russia is not a large ironmaking country, threw an additional demand upon this country, for the supply of steel, for a wide variety of purposes. No doubt, at the proper time, full recognition will be given of the important part played by America in the supply of metal to the fighting forces. Germany, at any rate, may be trusted to properly appreciate its importance.

New Uses for Steel

It is remarkable how the development of the war has found new uses for steel. At an early stage, it was found highly convenient to build the huts at the training camps of light steel. Still later steel helmets were introduced as the most efficient life savers, in a war involving an enormous proportion of head injuries, through the machine gun or the flight of the bursting shell. The latest news from Germany is that the next Zeps to be sent to us will be protected by steel armor, a very necessary provision, it would seem, in view of the ill luck which attended the most recent visits. Steel lining has also proved the best available protection in trenches, and the most popular and efficient dug-outs in France are so protected.

The British iron and steel trade has been the pioneer in the application of intelligent conciliation to wages and labor questions. The sliding scale has kept the peace through the war, and where the scale has not entirely covered all circumstances, the machinery of the northern and midland boards has facilitated negotiations, which have invariably led to amicable settlements.

The vital part played in the war by the kindred trades of iron, steel and coal made it impossible for the government to adopt an attitude of *laissez faire*. These great industries have, perforce, been at the very center of government building operations. Probably in no industry has the ordinary consumer been called upon to make such sacrifices. Great constructive undertakings are suspended, through the impossibility of getting steel. Railways, locomotive engines, of all kinds are wearing out, and are not being renewed or replaced. The enormous sacrifices thus involved have called for the highest displays of patriotism, and to the credit of this class be it said nowhere has there been less whining or grumbling. Many foreign customers have had to do without steel or go elsewhere. It is assumed here that a great deal of this business has inevitably been diverted to America. Nobody can forecast, in the present stage, whether it will come back. But the knowledge of the huge demand which will follow the war has a steadying influence. Iron and steel shares show no undue sensitiveness to military fluctuations. It is recognized that the after-war demand must, for a time, far outstrip the demand even of the war, so immense is the deprivation imposed upon all pacific uses of steel. Ship building, house building, rail laying and renewal, vast municipal undertakings, all in suspense, both from financial and national considerations, will come into the field with insistent calls for metal, which will keep the iron and steel mills and foundries of the world, and especially of this country, at full stretch for a long time.

In two directions, new elements are appearing which will have far reaching results. Enormous trade organizations are coming into being. The most important includes the greatest steel and engineering undertakings and is a new body with an entrance fee of £1,000. There will be a strong

effort to control this industry in a way never before attempted, and it seems likely that some form of tariff restriction may be introduced. In this direction, it is believed the government has already gone too far to recede in the measure of approval given to the recommendations of the Paris Economic Conference. More need not be said of this, at this stage, but interested nations will no doubt take due note of a development entirely novel in English economics, as far as this generation is concerned.

As to profits, while the steel firms have had a very good time, the taxation of profits by the government has kept down profits to a strict limit, and the government method of taking its share has aroused a bitter feeling which will increase the determination of the steelmaker to recover, as soon and as fully as possible, the control of his own industry.

What Will Happen After the War?

After the war, what? Boom, panic or what? Opinions differ widely as to what will happen after the trenches are deserted and peace once more reigns throughout the world. One of the most thoughtful and impressive articles that has been published on this subject is entitled, "Our Economic Peril", which appears in *The Yale Review* for July. The author is Arthur S. Dewing, one of the lecturers on economics at Yale and the author of "Corporate Promotions and Reorganizations". Prof. Dewing's article is well worth perusal in full. He places much emphasis upon belief or faith as a sustaining force in financial affairs and discusses in a learned manner the psychological phases of present conditions. His paper is in part as follows:

"Peace will bring its reassurances. Prices of the war necessities will fall precipitously. General business activity will show signs of revival. Gradually general prices will rise, with the increase of demand for commodities. Optimism will supplant pessimism and hesitancy. Large investments of fixed capital by producers of goods in plant extensions, and by consumers in better houses the more luxurious living, will easily absorb any accumulations of saving set aside during the war. These expenditures will run ahead of current savings, stimulated by rising prices and retarded wage increases. Interest rates on current loans will rise as the fabric of credit begins to stretch, but this sign of impending expansion, will, as always before, go unheeded. Within a time —depending somewhat on the saving reverses accumulated during the war, but probably not more than once and a half the period of the war—the United States will experience a general business boom on a scale of breadth and abandonment never before witnessed. Prices will be higher than ever, wages will be higher. All caution will be lost in a hectic orgy of speculation. Business men everywhere will come under its spell—the officers of the Federal Reserve bank as well as other human beings. Farther and farther will the fabric of credit stretch, for credit is itself a human thing based on the vague unreasoned feeling of confidence in the freedom of man and the stability of human institutions, sensitive to its environment as the emotions of a child. Having been stretched to its utmost, it will break. Then the deluge.

"The progress of the expansion of industrial activity may or may not be beset with temporary periods of hesitancy. Much will depend on the ease with which manufacturers of war materials, on the one hand, and general business men on the other, adjust themselves to the transition from war to peace. Strange to say, the longer the war lasts, the easier will be the adjustment. If the war lasts six months or more longer, the transition can be made without causing a quiver in general business. Adjustments, to be sure, must be made, but they will be fully anticipated. The industrial world will have so adjusted itself to the abnormalities of war that it will be immune to the final shock, its cessation.

"If, then, the war lasts through the present year we may presume that industrial activity will move steadily forward, in increasing volume, for a period of perhaps three of four years. Even though the wave of increasing industry comes with sudden impetuosity, it takes a year or more to get savings crystallized into fixed capital and credit expanded. Building plans must be drawn, contracts covering raw materials must be executed, even the physical transformation of fluid capital—whether money or movable materials—into structures takes a year or more. No matter how quickly business rebounds to the beneficient hopes of peace, a period of at least two years of expansion must be anticipated before the panic. On the other hand, one must remember that this country, at least, had been suffering from a general depression for several years before the war; in fact, there has been no broad business activity since the panic of 1907. The reaction time will depend almost entirely on the smoothness of the machinery of production.

"Further, the operation of the Federal Reserve bank is an unknown factor. It will probably extend the period of expansion, as well as intensify it, for it has substituted a human fiat for a predictable, albeit inflexible, set of oconomic conditions. The extensive effect of this human factor is, of course, unpredictable.

"In any case, when the crisis does come, it will be with unprecedented velocity and intensity. The very strength of the feeling of industrial optimism, made foolhardy by confidence in an untried banking law created to foster credit extension, will make easier a sudden reversal of feeling. And when the business community finally becomes conscious of its condition, the stretched credit will rebound with a force proportionate to the extent it was stretched. This sudden contraction will reach and paralyze all business. It will be more difficult to manage than previous panics, because United States will have assumed more of a place in the world industry. * * * The panic will be a dire calamity, for it will affect rich and poor alike, causing widespread failure and unemployment.

"It will come quickly and the period of intensity will soon be over. Then there will be a long time, five years perhaps, of business depression, forced economy and thrift. During this period the real and abiding economic effects of the war will show themselves. Europe will refund its debts. It will reorganize its industrial machinery to meet a world competition, the like of which was never seen. Social and economic theories everywhere will be subjected to new and more liberalized interpretations, and the practical results will show themselves in more intense industrial strife. Militarism will flourish in Europe and here, fostered by those very industrial classes who seek their economic emancipation through the conquest of the world's markets. It will be a period of economic rest—and waiting."

The Pittsburgh Sheet & Tin Plate Co. now controls the tin plate mill at Marietta, O., which has been idle for a number of years. The company recently has offered 300,000 base boxes of tin plate for sale.

The Huessener Engineering Co., Pittsburgh, has moved its offices to 1405 Oliver building, that city.

Iron and Money: Fact and Comment

Wall Street Has Another Depressing Week—Fear of Strike on Railroads Probably a Factor—Motor Stocks Especially Weak

FOR years before the declaration of war in 1914 by the European powers, there was a strong feeling throughout the world that for the very reason that a modern war participated in by even two great powers would result in a tremendous loss of life and property, there was little danger of such a war. But war came—war, the greatest in history.

Today, when the business world thinks of what would be the result of a war between the great railroad brotherhoods of the country and the railways, it is seen that losses to the railroads, to the employes and to the public would be so great that nothing but madness would cause the bringing on of such a conflict. But it may come. If it does not come, the alternative of war which has been suggested—government ownership of railroads—might be in the long run as bad as a fight against the demands of the brotherhoods.

Thoughts about the awful possibilities of paralyzing the railroad transportation of the country are probably having some effect on the stock market, for back of such influences as are easily seen there must be some cause not so readily discernible. The past week was another one of downward trend, with motor stocks the weakest on the list. Of course, the substantial cut made in the price of Ford cars, with the prices of nearly everything else—from a collar to a ship—advancing, naturally caused depression in the stocks of other companies which are making low priced cars. Other stocks, including those of steel companies enjoying the greatest prosperity, also dragged and declined, and Wall street refused to be influenced by anything favorable in the news as published from day to day.

Quotations on leading iron and steel stocks at the close of the New York stock exchange on Aug. 5 and net changes for the preceding week are shown in the following table:

	Close Aug. 5.	Net chg.
American Can	54	+ ⅛
American Can, prfd.	110	— ¾
Amer. Car & Fdy.	56⅛	+ ⅛
American Locomotive	65½	+2⅛
American Locomotive, prfd.	101	+ ½
American Steel Foundry	50	—2
Baldwin Locomotive	69⅞	+1⅞
Baldwin Locomotive, prfd.	105	— ⅛
Bethlehem Steel	430	—9½
Colorado Fuel & Iron	43	— ¾
Continental Can	94	—2½
Crucible Steel	66¾	— ⅛
Crucible Steel, prfd.	116	— ¼
General Electric	167¼	+ ¼
Gulf States Steel	72¼	.....
Gulf States Steel, 1st prfd.	91	.....
Gulf States Steel, 2nd prfd.	80	—3
International Harv. of N. J.	113¼	— ½
Lackawanna Steel	69¾	—1
Nat'l Enamel'g & Stmp. Co.	21⅞	—1⅛
Pressed Steel Car	47⅛	+ ¼
Pressed Steel Car, prfd.	100½	.....
Pullman Palace Car	*160	+ ⅝
Republic Iron & Steel	45⅝	— ⅛
Republic Iron & Steel, prfd.	109⅛	+ ⅜
U. S. Cast Iron Pipe & Fdy.	19⅛	— ⅛
United States Steel	86	+ ⅛
United States Steel, prfd.	*116¼	+1½
Westinghouse Mfg.	56	+1

*Ex dividend.

Following is a table comparing maximum quotations of iron and steel stocks not listed on the New York stock exchange at the close Aug. 5 and July 28:

	Aug. 4.	July 28.
American Radiator	.....	395
American Ship Building	42	44
Chicago Pneumatic Tool	67½	70
LaBelle Iron Works	53⅝	52¾
Lake Superior Corp'n	10¼	11
Stewart-Warner Speed Co.	102	104½
Warwick Iron & Steel	9¾	9½
Westinghouse Air Brake	.....	140
Westinghouse Elec. & Mfg.	.....	56

Financial Crop Ends

The regular quarterly dividend of 1¾ per cent on the outstanding preferred stock of the Taylor-Wharton Iron & Steel Co. for the three months ending June 30, 1916, has been declared payable August 1.

* * *

The Draper Co., Hopedale, Mass., manufacturer of looms and similar machinery, capitalized at $8,000,000, will be incorporated under the laws of Maine with an authorized capital stock of $17,500,000, which will be issued as common stock. The new stock will be exchanged for stock in the Massachusetts company on the basis of 2½ shares of common and 1¼ shares for the preferred.

* * *

Creditors of the Defunct Dayton Coal & Iron Co. met again Saturday. Meetings have been held at intervals of two weeks for the last two months but no report made as to definite prospects for sale of the property. Several interests have inspected the plant at Dayton, Tenn., recently, and an attorney for one class of creditors said today a sale might be made in the near future.

* * *

Earnings of the Ontario Steel Products Co., Ltd., Gananoque, Ont., manufacturer of springs, axles, shovels and tools, as expressed in the third annual report of the company, are representative of the general prosperity which has come to most all manufacturers of heavy iron and steel products. Net earnings of the company for the year ending June 30 were $152,019, almost double those in the previous year when they were $76,746. After deducting $36,000 interest on the $600,000 of bond outstanding, and $43,125, which was paid as dividends on the preferred stock, a surplus for the year's operation was $72,894. Since only 5¾ per cent dividends were paid on the preferred stock, this surplus is not to be figured as applicable to common dividends. The preferred stock outstanding is $750,000 of 7 per cent cumulative, upon which 7¼ per cent dividends are in arrears. Common stock outstanding is $750,000. After July 2, 1916, a sinking fund of 2 per cent of the bond issue is required.

* * *

Net profits of the Studebaker Corporation, South Bend, Ind., for the six months ending June 30, after deductions of ample depreciation and profit sharing, were $6,028,329, including $180,000 from war order profits. After deducting 3½ per cent for the semi-annual dividends on the preferred, the remainder is equal to 18.8 per cent on the common stock outstanding. Total surplus and reserves June 30, 1916, amount to $16,664,161. The corporation is wholly free from indebtedness, and its cash in banks exceeds $4,000,000.

* * *

A statement of comparative earnings of the Barrett Co., New York City, has been made public by President W. H. Childs, which shows a wonderful development in the business of the company. In addition to maintaining all its important plants at their maximum efficiency and charging off all items for maintenance to expense account, the comparative earnings for the first six months in each of the last three years, after deducting interest on the preferred stock for the same period in each case, in 1916 were $2,738,453; in 1915, $952,479; and in 1914, $545,077.

Net earnings for the first half of 1916, according to Mr. Childs, were equal to 24¼ per cent on the common stock for the half year.

* * *

A highly satisfactory statement of earnings for the six months ended June 30, 1916, has been issued by the American Steel Foundries, Chicago. This shows an increase in surplus over the same period in 1915 of $1,379,818. In a statement in connection with the report, the company announces that it has just closed for a second foreign order for munitions similar to its original contract which amounted to about $18,000,000. This last contract is to be filled by April, 1917. The company states that its earnings include no profits from its forge plant because of the delays resulting from a strike at the plant of the Westinghouse Electric & Mfg. Co., where the forgings are being machined. Sufficient orders now are on hand to insure full operations throughout the next year. The comparative report of earnings for the past three years is as follows:

	1916.	1915.	1914.
Net earnings	$1,374,226	$43,967	$242,100
Oth. income	55,241	30,155	42,683
Total income	1,429,467	74,122	284,845
Chgs. sk. fd. etc.	406,652	431,126	472,902
Surplus	1,022,815	*357,003	*188,057

*Deficit.

Business News of Nation's Capital

Michigan Congressman Proposes Plan for Abolishing "Pork"—Heavy Drawbacks Paid During the Past Year—Protests Against Transcontinental Rates

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Washington, Aug. 8.

AN EARNEST fight by a member of congress against "pork barrel" legislation is a rare thing. Such a contest, however, has been started by at least one representative, W. Frank James of Hancock, Mich. While he is serving his first term as a member of the United States congress, Mr. James is no novice as a legislator, for he has served ably and fearlessly in the legislature of his home state. His protest against the "pork barrel" therefore cannot be laughed at as being prompted by unsophistication rather than courage.

Among measures introduced by Mr. James to do away with "pork" is a joint resolution proposing an amendment to section 7, Article 1, of the constitution to authorize the President to veto any item without killing the appropriation bill.

It is refreshing to talk about "pork legislation" to an outspoken member of congress like Mr. James. His ideas are unusual, but, no doubt, are sound.

"When a member of congress thinks that his constituents want him to bring back 'pork', he is wrong, judging from my experience", said Mr. James. "There was introduced in the senate a bill for a public building for my home town of Hancock. It was stated in the press that it was presumed that a similar bill would be introduced in the house. Writing home I stated I did not intend to introduce any such bill at this session, and further, before thinking of introducing any bill for a public building in my district, I would first ask the department of the treasury whether the town was entitled to any, according to the receipts from the post office, and secondly, judging from the receipts, how much money would the government be warranted in spending.

The same sort of endorsement met Mr. James' action when he declined the "suggestion" that he work for the "common good", etc., and support the movement to have Fort Brady, located at Sault Ste. Marie, in the upper peninsula of Michigan, made into a regimental post. Mr. James told those making the "suggestion" that he was of the opinion that there are too many useless army posts and navy yards. He pointed out that the most competent army and nayy committee should be appointed to investigate the matter and report which of the useless army posts and navy yards should be abandoned, and said further, that if the committee recommended abandonment of Fort Brady, the fact that he lived in the upper peninsula of Michigan would not change his vote on the subject. Mr. James has also refused to support pension grabs. One bill he voted against meant personal financial gain to him as a Spanish war veteran. On this vote also, he received the endorsement of practically every paper in his district, as well as from many comrades and citizens there. Mr. James' record could be extended to show his anti-pork attitude, but the cases cited are sufficient to denote the fact that members of congress really do not understand their constituencies. It shows that their political lives do not depend upon their ability to acquire "pork". It may, on the contrary, show that the greater the tendency of a member of congress to grab pork, the less are his chances of continuing his political existence.

In addition to his joint resolution giving the President power to veto riders in appropriation bills, Mr. James has also introduced measures designed to take the pork out of pension and public building bills. The treasury department has given its hearty approval to the measure relating to the latter subject.

Speaking of his votes on the several measures mentioned, Mr. James said:

"In voting this way, I am entitled to no particular credit, and ask for none. Congressmen are wrong when they think the 'people back home' want you to bring back the 'pork'. The twelfth district of Michigan is composed of the same kind of people as the average district, I believe. If the people of the twelfth district are anxious to have their representative bring back 'pork' they have concealed their wishes from him."

Not Reasonable

Washington, Aug. 8. — Acting upon the complaint of the Sanford-Day Iron Works and the Fulton Co., manufacturers of mine cars and machinery, respectively, with their principal offices in Knoxville, Tenn., the interstate commerce commission has rendered an opinion that rates charged for less-than-carload shipments of iron bolts, nuts, rivets and washers from Cincinnati, Cleveland, Berea and Newburg, O., Louisville, Ky., and Pittsburgh to Knoxville were unreasonable to the extent that they exceed aggregates of intermediate rates. Charges were collected on the shipments from Pittsburgh at a joint fifth class rate of 55c per 100 pounds. Charges on shipments from Cleveland, Berea and Newburg were based on a combination rate of 55c, composed of a fourth class rate of 15c to Cincinnati and a fifth class rate of 40c beyond. On the shipments from Cincinnati and Louisville the fifth class rate of 40c was applied. The new rates will be 31 1/3c from Cincinnati and Louisville; 46 1/3c from Cleveland, Berea and Newburg, and 49 1/3c from Pittsburgh. The new rates become effective on Oct. 16.

The commission denied the application of the Louisville & Nashville railroad to continue rates on less-than-carload shipments of iron bolts, nuts, rivets and washers from Cincinnati and Louisville to Knoxville in excess of the aggregates on intermediates to and from Croydon, Ky.

Vigorous Protests

Washington, Aug. 8.—Iron and steel manufacturers and consumers have entered vigorous protests with the interstate commerce commission against proposed transcontinental rates filed with that body, to become effective Sept. 1. The joint tariffs propose tremendous increases over prevailing rates and were filed as the result of the recent decision of the commission in the so-called intermountain rate case in which the railroads were ordered to remove the discrimination in rates existing against intermediate shippers to the advantage of the coast intefests. While considerable confusion as to the tariffs has developed, they are commonly interpreted as meaning that the new rate on iron and steel articles to Pacific coast terminals has been blanketed and established at 94c per 100 pounds on structural material. This class constitutes the bulk of products which are affected. Other classes have been advanced proportionately.

The present rate on structural material from Chicago to Pacific coast terminal is 55c per 100 pounds, from Pittsburgh, 65c, and from New York 75c. These differentials apparently would be entirely eliminated by the new tariffs and

the individual rate of 94c, established, thus advancing the rate from Chicago 39c per 100 pounds, from Pittsburgh 29c, and from New York 19c. Intermediate rates have also been increased, the proposed Chicago-Pacific coast rate being $1.01, and the Pittsburgh-Pacific coast rate being $1.08. The proposed Missouri-Pacific coast is 79c. The order of the commission required the railroads to maintain differentials between the Pacific coast and intermediate points upon the basis of percentages set forth in its original decision in the intermountain rate case some five years ago, by which zones were established. By this zone system, rates to the Pacific coast were made lower than those to intermediate points, higher rates being charged to the latter destination because of the back hauls involved. The order requiring the railroads to do away with the discrimination against intermediate points was based upon the claim that water competition through the Panama canal had temporarily disappeared. There is considerable speculation being indulged in as to whether the proposed adjustment of the rates follows the spirit and letter of the commissioner's recent fourth section order. The opinion seems to prevail that at least the letter, if not the spirit, of the order has been recognized by the new tariffs. Because the increases are so extremely large, however, there is doubt, that the spirit of the order has been followed.

Based upon something like 600 protests which were filed with the commission last week by shippers against the proposed advances, which, in addition to affecting iron and steel shipments to the west, also affect shipment of canned goods from the Pacific coast to the east, the commission has entered an order calling for a conference on the new tariffs. These protests ask for suspension of the tariff, and will be discussed when the conference, to be informal in character, is held in Washington before the commission's board of suspension at 10:00 a. m., August 14. Present at this conference will be railroad representatives and the protesting shippers. It is the hope of the protestants that they will be able not only to cause the railroads to submit new tariffs establishing lower rates than those now proposed, but that the effective date of the tariffs will be extended.

Heavy Drawbacks

Washington, Aug. 8.—That drawbacks have been increasing rapidly since the outbreak of the European war is strikingly shown in a statement submitted to the senate last week by Secretary of the Treasury McAdoo. The data were compiled as the result of a resolution introduced by Senator Broussard, Democrat, of Louisiana, which is designed to have withdraw privileges discontinued during the war. It is not expected that the senate committee on finance, to which the resolution was referred, will give it favorable consideration. Mr. Broussard has been a consistent advocate of tariff protection for the domestic sugar industry, and his resolution would not only afford such protection, but Mr. Broussard also points out that it would mean a saving of much revenue for the government which it needs so urgently at this particular time of heavy appropriations. Manufacturers throughout the country have protested against the Broussard resolution. The administration is understood to be strongly opposed to it.

The statement shows drawbacks paid out by the treasury department during the past three fiscal years. For the year ended June 30, 1914, one year before the war was begun, the drawbacks amounted to $3,156,132.44. For the fiscal year 1915, they totaled $7,346,510.41, and for the first half of the fiscal year 1916, to Jan. 1, drawbacks paid out amounted to $5,818,161.65, while there were pending drawbacks claimed, but unpaid, totaling $5,619,267.63. Mr. McAdoo calculated that during the second half of the fiscal year ending June 30, 1916, the drawbacks paid out would total $9,480,296. Of the $16,000,000 or more paid in drawbacks for the fiscal year 1916, more than $13,000,000 was paid on raw sugar which had been imported after being refined. For the first half of the fiscal year just ended, drawbacks on aluminum manufactures amounting to $19,773 had been paid to the United States Aluminum Co. of America, and $20,723 more was claimed but unpaid. During the second half of the fiscal year 1916, drawbacks on aluminum sheets, etc., amounted to $45,215. During entire fiscal year just closed drawbacks paid on automobiles exceeded $44,000; on shrapnel shells, $96,000; on lead products, $57,000; on chemical and medicinal preparations, $356,900, and on dynamite, $34,300.

Changes Justified

Washington, Aug. 8. — Changes proposed by railroads in descriptions and ratings in belting or sprocket chains in official classification territory were held to be justified in an opinion handed down last week by the interstate commerce commission. The new descriptions and ratings become effective on Oct. 30.

The new tariff divides iron and steel belting or sprocket chains into malleable iron chains and steel chains. A further distinction was made between steel belting or sprocket chains, machine finished, and other than machine finished. The classification descriptions were thereby made more specific, but, according to the opinion, no substantial change was made in the ratings other than that mentioned.

Recently increased chain ratings were approved in southern and western classifications.

Machinery Markets in South America

A report on machinery markets in Peru, Bolivia and Chile has been issued by the bureau of foreign and domestic commerce. The publication is based upon investigations made in those countries by Special Agent J. A. Massel, of the bureau, and it reviews, for the benefit of American manufacturers, the general conditions found there as affecting the use and purchase of machinery. It gives, with some fullness, the latest available statistics for the imports of machinery and related classes of manufactured products, discusses the character and methods of the machinery trade, and describes in detail the equipment of the chief plants and establishments in the predominant industry or industries of each market.

Copies of Special Agents Series No. 118, "Markets for Machinery and Machine Tools in Peru, Bolivia and Chile," may be procured from the superintendent of documents, government printing office, Washington, D. C., or from the district offices of the bureau of foreign and domestic commerce at 10 cents each.

Largest Submarine.—The Fore River Ship Building Corporation, Quincy, Mass., has started construction work on the Schley, which when completed will be the largest submarine in the United States navy. She will be about 270 feet over all. The Schley will have an ordinary radius of action of about 2,500 miles without replenishing her fuel tanks. If necessary, she will be able to carry oil to take her twice that distance. Diesel engines will give her a surface speed of about 20 knots and electric motors will give a submerged speed of about 11 knots. Using only her storage batteries, the Schley will be able to travel completely submerged for a day. The vessel will cost about $1,400,000.

The Buffalo Brass & Copper Rolling Mill Co., Buffalo, N. Y., has purchased the Bridgeport Crucible Co., Bridgeport, Conn., and the Taunton Crucible Co., Taunton, Mass., the latter being owned by the Bridgeport company. W. T. MacFarlane will retire from the presidency and active management of the Bridgeport Crucible Co.

Production of Miscellaneous Iron and Steel Products in the United States in 1915

Compiled by the Statistical Bureau of the American Iron and Steel Institute

PRODUCTION OF TINPLATES AND TERNE PLATES, 1891–1915.

Years.	Tinplates.	Terne plates.	Total pounds.
1891 (second 6 months)	368,400	1,868,343	2,236,743
1892 (calendar year)	13,921,296	28,197,896	42,119,192
1893	64,536,209	59,070,498	123,606,707
1894	102,223,407	64,120,002	166,343,409
1895	165,927,907	88,683,488	254,611,395
1896	270,151,785	89,058,013	359,209,798
1897 (first 6 months)	203,028,258	49,545,643	252,573,901
1897 (second 6 months)	.....	.....	322,205,619
1898 (calendar year)	.....	.....	732,289,600
1899	.....	.....	808,360,000
1900 (cen. year end. May 31)	707,718,239	141,285,783	*850,004,495
1901 (calendar year)	.....	.....	894,411,840
1902	.....	.....	806,400,000
1903	.....	.....	1,075,200,000
1904 (cen. year end. Dec. 31)	867,526,985	158,857,866	*1,032,940,706
1905 (calendar year)	.....	.....	1,105,440,000
1906	1,100,373,000	193,367,000	1,293,740,000
1907	996,650,000	156,447,000	1,153,097,000
1908	1,048,896,000	154,179,000	1,203,075,000
1909	1,179,858,000	190,930,000	1,370,788,000
1910	1,450,821,000	168,184,000	1,619,005,000
1911	1,597,629,000	158,441,000	1,756,070,000
1912	1,965,659,000	191,396,000	2,157,055,000
1913	1,708,186,000	136,944,000	1,845,130,000
1914	1,939,785,000	146,195,000	2,085,980,000
1915	2,201,825,054	163,470,646	2,365,295,700

* Includes 1,000,473 pounds in 1900 and 6,555,855 pounds in 1904 of "other sheet iron and sheet steel, tin or terne plated."

PRODUCTION OF WIRE NAILS IN 100-LB. KEGS, 1888–1915.

Years.	Production.	Exports.	Consumption.	Years.	Production.	Exports.	Consumption.
1888	1,500,000	13,414	1,486,586	1902	10,982,246	595,391	10,386,855
1889	2,435,000	19,172	2,415,828	1903	9,631,661	704,546	8,927,115
1890	3,135,911	18,395	3,117,516	1904	11,926,661	734,554	11,192,107
1891	4,114,385	18,986	4,095,399	1905	10,854,892	799,734	10,055,158
1892	4,719,524	21,387	4,698,137	1906	11,486,647	1,035,705	10,450,942
1893	5,095,945	27,451	5,068,494	1907	11,731,044	945,035	10,786,009
1894	5,681,801	38,920	5,642,881	1908	10,662,972	593,819	10,069,153
1895	5,841,403	53,012	5,788,391	1909	13,916,053	686,687	13,229,366
1896	4,719,860	95,638	4,624,222	1910	12,704,902	960,295	11,744,607
1897	8,997,245	129,767	8,867,478	1911	13,437,728	1,200,957	12,236,821
1898	7,418,475	307,190	7,111,285	1912	14,659,700	1,530,353	13,129,347
1899	7,618,130	750,781	6,867,349	1913	13,559,727	977,477	12,582,250
1900	7,233,979	613,858	6,620,121	1914	13,132,814	809,167	12,323,647
1901	9,803,822	420,506	9,383,316	1915	14,583,026	2,051,475	12,531,551

PRODUCTION OF COKE AND CHARCOAL TINPLATES, 1915.

States	Coke. Pounds.	Charcoal. Pounds.	Total. Pounds.
Pennsylvania	1,209,841,898	16,702,586	1,226,544,484
Maryland, West Virginia	384,260,206	18,626,616	402,886,822
Ohio, Indiana, Ill., Michigan	564,550,274	7,843,474	572,393,748
Total	*2,158,652,378	43,172,676	2,201,825,054

* Includes 5,930,000 pounds in 1915 and 6,227,000 pounds in 1914 which were formed or stamped from black plates by companies which manufacture tinplates and tinned after the completion of the forming or stamping process.

PRODUCTION OF WROUGHT IRON AND STEEL PIPE AND BOILER TUBES, 1914–1915.

Kinds of pipe.	1914—Gross tons.			1915—Gross tons.		
	Iron.	Steel.	Total.	Iron.	Steel.	Total.
Black, standard	102,244	562,263	664,507	112,470	711,297	823,767
Galvanized	31,896	233,133	265,029	27,702	253,242	280,944
Oil country goods	50,824	568,467	619,291	39,753	563,167	602,920
O. D. and misc.	343	111,042	111,385	108	115,005	115,113
Boiler tubes	26,840	50,652	77,492	26,480	70,450	96,930
Total	212,147	1,525,557	1,737,704	206,513	1,713,161	1,919,674

APPROXIMATE CONSUMPTION OF TINPLATES AND TERNE PLATES, GROSS TONS, 1900–1915.

Calendar years.	Production.	Add imports.	Deduct exports.	Approximate consumption.
1900 (census year)	*379,466	60,386	273	439,579
1901	399,291	77,395	439	476,247
1902	360,000	60,115	1,566	418,549
1903	480,000	47,360	292	527,068
1904 (census year)	*461,134	70,652	7,898	523,888
1905	493,500	65,740	7,941	551,299
1906	577,562	56,983	12,082	622,463
1907	514,775	57,773	10,203	562,345
1908	537,087	58,490	11,878	583,699
1909	611,959	62,593	9,327	665,225
1910	722,770	66,640	12,445	776,965
1911	783,960	14,099	61,381	736,678
1912	962,971	2,052	81,694	883,329
1913	823,719	20,680	57,812	786,587
1914	931,241	15,411	59,549	887,103
1915	1,055,936	2,350	154,642	903,644

* For 1900 the census year ended May 31, 1900; for 1904, December 31, 1904.

PRODUCTION OF CAST IRON PIPE, NET TONS, 1914–1915.

Kinds of pipe.	1914—Net tons.			1915—Net tons.		
	Pipe	Fittings.	Total.	Pipe.	Fittings.	Total.
Gas and water*	891,646	46,651	938,297	911,901	44,471	956,372
Soil and plumbers'	164,866	57,617	222,483	184,869	73,629	258,498
Total	1,056,512	104,268	1,160,780	1,096,770	118,100	1,214,870

* Includes culvert pipe. Manufacturers able to separate their production report 18,900 tons of culvert pipe in 1914 and 25,140 tons in 1915.

PRODUCTION OF CUT NAILS IN 100-LB. KEGS, 1888–1915.

Years.	Production.	Exports.	Consumption.	Years.	Production.	Exports.	Consumption.
1888	6,493,591	121,606	6,371,985	1902	1,633,762	161,228	1,472,534
1889	5,810,758	117,967	5,692,791	1903	1,435,893	199,126	1,236,767
1890	5,640,946	134,374	5,506,572	1904	1,283,362	207,720	1,075,642
1891	5,002,176	103,836	4,898,340	1905	1,357,549	176,741	1,180,808
1892	4,507,819	152,686	4,355,133	1906	1,189,239	169,519	1,019,720
1893	3,048,933	131,910	2,917,023	1907	1,109,138	155,212	953,926
1894	2,425,060	183,229	2,241,831	1908	956,182	157,319	798,863
1895	2,129,894	176,394	1,953,500	1909	1,207,597	222,565	985,032
1896	1,615,870	237,088	1,378,782	1910	1,005,233	182,087	823,146
1897	2,106,799	337,732	1,769,067	1911	967,636	255,854	711,782
1898	1,572,221	352,473	1,219,748	1912	978,415	208,568	769,847
1899	1,904,340	223,425	1,680,915	1913	842,038	84,885	757,153
1900	1,573,494	250,053	1,323,441	1914	769,665	76,676	692,989
1901	1,542,240	208,359	1,333,881	1915	775,327	94,878	680,449

PRODUCTION OF IRON AND STEEL GALVANIZED SHEETS.

Products.	1914—Pounds.		
	Iron.	Steel.	Total.
Galvanized sheets	91,235,731	1,716,431,398	1,807,667,129
Galvanized formed products*	3,879,072	127,724,537	131,603,609
Total	95,114,803	1,844,155,935	1,939,270,738

Products.	1915—Pounds.		
	Iron.	Steel.	Total.
Galvanized sheets	32,614,505	1,548,954,701	1,581,569,206
Galvanized formed products*	1,115,440	111,152,350	112,267,790
Total	33,729,945	1,660,107,051	1,693,836,996

* Articles formed or stamped from iron or steel black plates or black sheets and galvanized after the completion of the forming or stamping process.

Many Millions Spent for Tungsten

Very Large Production and Extremely High Prices, Which Declined as New Mines Were Opened—Cause of the Extraordinary Demand

TUNGSTEN production of the United States during the first six months of 1916 exceeded the production of this or any other country in any previous 12 months. Prices were more phenomenal than production and reached more than 10 times their ordinary level. The output was equivalent to about 3,290 short tons of 60 per cent concentrates, valued at $9,113,000, according to an estimate made by Frank L. Hess, of the United States geological survey, department of the interior.

These figures are no less noteworthy when it is known that in 1915 much the larger part of the production was in the second half of the year, so that the total domestic output for the 12 months ending June 30, 1916, probably amounted to about 5,000 tons.

Colorado has regained its lead in the production of tungsten ores, and, between Jan. 1 and June 30, marketed 1,505 tons, valued at $3,638,000, of which the Boulder field furnished 1,494 tons. California sold 984 tons, valued at $3,005,000.

The tremendous increase of prices caused by the need for "high speed" tools to cut war steel ordered by the governments of Europe, of course, caused the great increase in production. Prices at the beginning of the year were irregular and depended on the buyer's need of the ore and probably on his fear of the possibility of not being able to get it when he might need it even more. Ores carrying 60 per cent tungsten trioxide brought at that time as much as $66 a unit, but by the last of March some fermerite sold for $93.50 a unit at the mills, and even higher prices were quoted in the newspapers, though they could not be confirmed. The prices of the same ore in the New York market would naturally be somewhat higher. Under the stimulus of these high prices, production, not only in this country, but in the world at large, has been at the highest point ever known. At first the sudden demand created by the orders for war steel was far ahead of the instant productive power of the country. The rapid increase in prices, starting last fall at a time when tungsten mining was at a low ebb and culminating in the undreamed maximum mentioned, caused prospecting and consequent discoveries of new deposits, increase of development of known deposits, the operating at high tension of old mills, and the hasty building of new mills. As a result, the production increased faster than the consumption and soon overran the demand that would absorb the output at the extremely high prices prevailing, so that a drop in prices was inevitable. June closed with the price around $25 a unit, which was still much higher than any price known before this year. The highest price previously reported to the geological survey was $15 a unit, paid in 1907. The normal price has been $6 to $7.

During the six months under consideration, 40 mills of various types and sizes were in operation part or all of the time on tungsten ores, and at the end of June 14 were under construction.

In the tungsten mining camps the excitement that followed the increase of prices was similar to that caused by important gold discoveries. Nederland, Colo., a little village of two or three dozen homes, suddenly became a town of 3,000 or more inhabitants. East of Nederland two settlements, each containing several hundred people, sprang into existence. Atolia, Cal., a camp of 60 or 80 people, grew to more than a thousand.

In the Boulder, region, Colorado, 10 mills, six of which were new, were in operation. Besides these, at the end of June five old mills were being overhauled to work on tungsten ores and three new ones were under construction.

The prophecy made by the geological survey several years ago that the production of tungsten ores would probably be greatly increased with an increase in price, and that new deposits equal to those known might be found, has now received abundant confirmation.

The consumption of tungsten in the United States was even greater than was indicated by the ores produced, for all parts of the world free from the control of the warring European nations were drawn on for supplies, and during the first five months of the year 1,520 tons of tungsten ore, valued at $3,449,311, were imported. The June imports were probably equal to the average of the five preceding months, making the total for the half year 1,824 tons, valued at $4,139,000. Some of the ore imported is known to have been of low grade, but a considerable quantity carries more than 60 per cent tungsten trioxide, and probably the average was not far from 60 per cent WO_3. Most of the ore came from South America—Peru, Bolivia, Argentina and a little from Brazil—but some ore came from Japan and Mexico. Some of that imported, like a little of the American ore, contained phosphorus, arsenic, copper and other harmful impurities, but during the height of the demand even this ore was readily bought. By June, buyers became more careful and it was not so easy to sell bad ore.

If the American production and imports are added, the consumption seems to have amounted, roughly, to 5,100 tons of 60 per cent concentrates, valued at $13,279,000. On the supposition that 20 per cent of the metal was lost in various operations, it seems probable that between 11,000 and 12,000 tons of new high-speed steels were made during the period, in addition to the steel made from tungsten saved from scrap and scale.

Ore From Crimora

The new mill which the Crimora Manganese Corporation, 15 Broad street, New York City, has been building for the development of the manganese ore deposits at Crimora, Va., has begun operations. The company announces that its present output is approximately 40 tons of ore daily, but it expects to increase the output to the full plant capacity of 200 tons daily. At the present time, the mineral is being extracted near the surface. As the excavating has gone deeper, the company reports the ore has become higher in manganese content and lower in silica and iron. The Crimora mine is located in Augusta county, Va. A number of years ago it was operated extensively by the Carnegie Steel Co. and a large tonnage was produced. In recent years its activities have been irregular and the output has been small.

Walter E. Holloway, formerly affiliated with the Argus Smelting Co., of New York, has incorporated the Walter E. Holloway Co., 320 Broadway, New York, which has been organized to engage in the sale of copper, tin, spelter, lead, aluminum, ingot brass and bronze mixtures.

News of Employers and Employes

Strike of Machinists at Milwaukee is Weakening—Interesting Feature of Welfare Work of the Colorado Fuel & Iron Co.—Other Labor News

MILWAUKEE, WIS., Aug. 7.—The Milwaukee machinists' strike appears to be on the wane, and, if published newspaper reports are true, there is considerable dissatisfaction in the ranks of the strikers over the manner in which the strike is being conducted. One of the principal faults pointed out is the apparent lack of preparation and the delay in perfecting a system of strike benefits.

The latter reason is said to be responsible for a generous return to work, the dissatisfied strikers having failed to be convinced of the usefulness of remaining away from their jobs, which were paying them the largest wages machinists in this district have ever received, and then not receive the $8-a-week strike benefit promised them during the agitation for the concerted demand for an 8-hour day.

When the dissatisfaction came to light, it is stated that the leaders of the strike hastened to make arrangements for an employment bureau; raising funds to pay strike benefits, and other remedies to appease the wrath of dissatisfied strikers.

In many quarters, the opinion is held that the firm stand taken by the Milwaukee Metal Trades and Founders' Association that the July 1 reduction of the working week from 55 hours to 52½ hours was all that present conditions could stand, is a surprise to the eastern agitators imported to organize the big strike. With books filled with orders which assure profits considerably in excess of gains netted on orders booked during the two or three years prior to the war, it was expected that employers would not dare to resist the demands of their employes. However, the employers have "stood pat" on their voluntary reduction and willingness to reduce the working schedule when economic conditions will permit, and this is somewhat disconcerting. Then, too, every shop "struck" by the unions is operating and doing good business. There has not been anything to approach a complete tie-up since the first shop was struck.

This week has seen a few small walkouts, but the energy displayed at the beginning seems to be lacking. It is claimed that more men have returned to work this week than walked out. The strikers who did not wish to strike in the first instance, but did not find their courage until now, boast of the fact that they will get a fat pay envelope, as before, within a few days, while others are still awaiting strike benefits.

Wage Advance

The Youngstown Sheet & Tube Co., Youngstown, and the A. M. Byers Co., Pittsburgh, operating mills in that city and in Girard, O., have announced that they have advanced wages of bar iron mill employes to meet scales recently signed by mills working under the Amalgamated Association of Iron, Steel and Tin Workers' wage agreement. Puddlers now are receiving $8.80 a ton for boiling, or 40 cents a ton above the previously prevailing rate.

Compromise Agreed Upon

Trenton, N. J., Aug. 8.—A strike of iron molders involving nearly all large plants in Trenton finally has been settled through the efforts of the chamber of commerce in this city. The strike was started several months ago when demands for an increase in the daily wages from a minimum of $3.50 to $4 were made by the molders and refused by the employers. At a meeting of employers, the chamber of commerce, Clifton Reeves, federal commissioner of conciliation, and Prof. John E. Gill, it was decided to settle the strike by allowing a compromise at $3.85 a day.

The strike was one of the longest and most bitterly contested in the history of this city, having been marked by several riots and arrests. Several of the manufacturers had gone so far as to fit up homes for independent workmen brought in while the trouble was at its height.

Trained Women Workers

Denver, Aug. 8.—A corps of trained women workers along medical, social and domestic lines, was put to work in the coal and iron mining camps and the steel plant of the Colorado Fuel & Iron Co., today. The system just initiated, and which is to be extended widely throughout the properties of the corporation, is due to the combined action of the Colorado Fuel & Iron Co., the Y. M. C. A. and John D. Rockefeller Jr.

The new arrangement goes into effect with five women workers, each one an expert, in the field. Two of the corps will have their headquarters at Primero, where a dispensary, erected by Mr. Rockefeller, has just been completed. These young women will extend their activities through the closely adjacent camps of Primero, Frederick and Segundo.

In securing the services of women workers at the coal mines, iron mines and steel works, the company was actuated largely by the need of a more efficient and intimate medical and social service. It became apparent that the medical department, already well equipped for dealing with cases of illness and accident, would gain greatly in efficiency by having trained nurses for dispensary work and to provide home instruction in matters of sanitation and hygiene. At the same time it was thought that the work of the Y. M. C. A., inaugurated in most of the camps at the beginning of the present year, could be rendered far more valuable if it could be intimately related to the homes of the miners by the services of trained social workers. The matter was given earnest consideration by the company officers, by the management of the Y. M. C. A. under Secretary A. B. Minear, and by John D. Rockefeller Jr. Mr. Rockefeller already had donated the two new dispensaries at Primero and Sunrise. He became intensely interested in the matter of securing visiting nurses and social workers, and volunteered to personally pay the salary of one of the women workers.

Many Employes March

The recent preparedness parade in Milwaukee in which more than 30,000 people demonstrated their enthusiasm was marked by the co-operation of the employes of the many industrial plants in that city. In the case of one manufacturer, the Cutler-Hammer Mfg. Co., more than 1,300 of the 1,600 employes marched in the parade. The Cutler-Hammer division of the parade was headed by a special band which was followed by a company dressed as marines. The other employes of the company, men and women, carried red, white and blue parasols and wore colored paper hats.

Nickel Company

Is Incorporated With Large Powers—Government Policy Defined

Toronto, Aug. 7. — The first step towards the establishment of a Canadian branch refining plant of the International Nickel Co. has been taken by the issue of a Canadian charter of incorporation to the International Nickel Co. of Canada, Ltd., with a capital of $5,000,000. The nominal incorporators are lawyers and clerks. The company is given very wide powers including the development of all kinds of minerals, building of vessels, etc. The head office is given as Toronto, which indicates that the proposed refinery will be somewhere in Ontario and not on the Nova Scotia seaboard as at first contemplated. Meanwhile the representatives of the company are examining locations in the Niagara district.

The policy of the Ontario government as regards the nickel question is outlined in a statement by Hon. G. Howard Ferguson, provincial minister of mines, who says that the government does not propose to undertake nickel refining itself, but will perfect the process with which it is now experimenting and will compel the refining companies to use that process, for which they will pay the government a royalty and to do the work of refining in Ontario.

According to returns made to the Imperial Munitions Board of Ottawa, the production of shells is very slow. In many cases, the output of the plants is below half of what it should be. The difficulty is lack of sufficient co-operation, parts of the industry being held back because of the delay by others. Many of the manufacturers appear to have taken orders beyond their ability to execute.

Col. Thomas Cantley, president of the Nova Scotia Steel & Coal Co., has returned from a trip of inspection to the properties of the company. He states that while the quantity of iron ore being mined at Wabana is less than under normal conditions, a considerable amount of new territory has been opened in the submarine workings. All the levels driven have continued in ore from 18 to 32 feet high, all of which is clear and high grade. At Sydney mine, the output is much greater than before the war. At New Glasgow the plant is making a record production and the Eastern Car Co., a subsidiary, is working at high pressure on large foreign government orders. The company has booked at present business amounting to nearly four times that of any normal year in value.

Takes Over Business.—The Standard Metalwork Co., Thompsonville, Conn., capitalized at $300,000 has assumed the liabilities and business of the old corporation of the same name and has retained the same officers. The Standard Metalwork Co. has made parts for auto engines for some years and plans to take care of increased business with the added capacity provided by the purchase of the adjacent property of the Bushnell Press Co. The company has manufactured some war munitions in recent years.

Will Expand

And Re-incorporate Automobile Motor Plant

Sheboygan Falls, Wis., Aug. 8.—The report that Andrews & Co., bankers, Chicago and Cleveland, have taken a large financial interest in the Falls Machine Co., automobile motors, Sheboygan Falls, Wis., is confirmed by the company. The concern will be re-incorporated at once under the laws of Virginia, with an authorized capital of $1,500,000. Present officers will be continued and the new interest given representation on the board of directors. The new style will be Falls Motors Co. The company employs 400 men and is turning out 15,000 motors. Additions now under way will increase the capacity to 25,000 or 30,000 motors annually, and the working force from 400 to 600 or 700 men. The principal customers at this time are the Grant Motor Car Co., Findlay, O., and Cleveland; the Elgin Motor Car Co., Chicago, and the Hollier Eight division of the Lewis Spring & Axle Co., Jackson, Mich. The officers of the company are: President, Gustave Huette; vice president, R. W. Randall; secretary, Angelo R. Clas; treasurer, Konrad Schreier. The manufacture of woodworking machinery not only will be continued, but also will be carried on more extensively.

Will Resume After Five Years

The Hirsch Rolling Mill Co., at Benton, Mo., near the western limit of the city of St. Louis, which suspended operations more than five years ago, will resume the manufacture of bar iron and shapes at an early date. A force of 100 men has been put to work preparing the plant for operation. Within the next 60 days, according to Marcus A. Hirsch, president of the company, the plant will begin the manufacture of steel rails, and will operate 24 hours a day, employing at least 300 men. The full capacity of the plant, he said, will be 60,000 tons a year.

Toluol Prices

Are Still Undetermined — Sounding Benzol Market

New York, August 7.—Toluol prices still are undetermined, as not enough new business has been closed to settle the market. Indications point, however, to the fact that general conditions are not as easy as seemed a week ago. Leading sellers now believe the settling price will be higher than previously had been foreshadowed and that the market may not go below $4 per gallon. Some toluol pressing for sale has been offered freely and has appeared greater than the actual amount. Some orders still are being distributed against old $4.50 contracts. Trinitrotoluol makers in this country who are figuring on the covering of new requirements under munition contracts just placed are inquiring actively and foreign buyers also are asking for large quantities, but these buyers are acting slowly. A canvass of the producing situation shows a fair amount of toluol is available before Jan. 1.

Considerably more sounding of the pure benzol market is being done by prospective buyers and some large quantities are mentioned. Sales, however, are modest. Spot product is difficult to find. Prices are steady at 70 to 75 cents per gallon. Supplies of solvent naphtha are more liberal and sales heavier, but prices have held at 40 to 45 cents per gallon.

Inquiry for 500 tons of sulphate of ammonia for export is current. Large sellers have disposed of their expected output so extensively, under contracts with the fertilizer manufacturers, that they are little interested in spot demand and want higher prices.

The current quotations per gallon at the maker's plant on leading coke oven by-products, are as follows:

Pure benzol, spot	$0.70 to .75
Pure benzol, contract	.70
Toluol, spot	(market not defined)
Toluol, contract	(market not defined)
Solvent, naphtha, spot	.45
Solvent naphtha, contract	.40

Sulphate of ammonia is $3.25 to $3.35 per 100 pounds at tidewater for contract and slightly higher for spot.

Track Improvements

The New York, New Haven & Hartford Railroad Co. announces that it will expend $7,000,000 for track improvements in New Haven, Conn., which will include the abolition of grade crossings and the erection of new stations.

The machine tool equipment and plant of Woodward & Co., Elizabeth, N. J., munitions maker, has been acquired by Thurlow Steel Works, Chester, Pa.

Many Tools Sold, Big Lists Pending

American and Baldwin Locomotive as Well as Bethlehem, Midvale and General Electric Buy Heavily—Western Markets Quiet

THE major portion of the heavy lathe business, which was reported under negotiation in last week's issue of *The Iron Trade Review*, has been closed, with the result that the expenditure for tools during the last 10 days has amounted to fully $2,000,000. The largest buyer was the American Locomotive Co., which shared extensively in the huge shell orders recently distributed in this country by the British government. It is understood the American Locomotive Co. bought not only such lathes as are needed in its own shops in connection with these shell contracts, but placed the requirements of other companies which either took shell contracts or subcontracts from the American company. This interest bought approximately 180 Le Blond heavy duty lathes, 50 Barrett special boring lathes, a few Pond lathes, and 230 Lodge & Shipley, Bridgeford, Stanwood & Gamble and Douglas lathes. All these machines are large swing, for making 6-inch, 8-inch and 9.2-inch shells, and are booked for early delivery. The Bethlehem Steel Co. closed for more than 100 large-swing lathes. This company just has asked for bids on a big list of equipment for its Sparrows Point plant. The Baldwin Locomotive Works also closed for more than 100 large-swing lathes for delivery before the end of this year. The E. W. Bliss Co. was another exceedingly large buyer, closing for approximately 100 large-swing lathes, also for early delivery. American Car & Foundry Co. also closed for a heavy list of tools, but the extent of its buying has not yet been learned. The General Electric Co. put out inquiries for a number of 24 to 36-inch lathes, but has not yet closed.

The surprising feature of this huge business in heavy lathes is the early delivery which has been agreed upon in most cases. Large numbers of these lathes have been promised for shipment within seven or eight weeks. Practically all the companies mentioned above also bought miscellaneous equipment during the week. A good many of them, including the Bethlehem company, still are in the market for miscellaneous tools. One of the big prospective buyers of machine shop equipment is the General Electric Co. The Midvale Steel & Ordnance Co., which has been in the market almost steadily during the past two months, continues to place good-sized orders. The lathe requirements of this company, however, appear to have been satisfied.

In addition to the above business from munition makers, the domestic demand generally is active and of a diversified character. Reports from sales managers show that contributions to the total of business booked are coming from all sections of the country. The railroads are buying in small lots, but the only important business from these interests during the week was the distribution by the Southern Pacific of a list on which it took bids several weeks ago. Export business continues to diminish. Makers of cutting-off machines, for which there is an active demand, advanced their prices 20 per cent during the week. The Long Island railroad is inquiring for a 25-ton yard gantry crane. The Bethlehem Steel Co. is in the market for a 25-ton, single-leg gantry crane. There is an inquiry in the market for two 10-ton cranes for Norway.

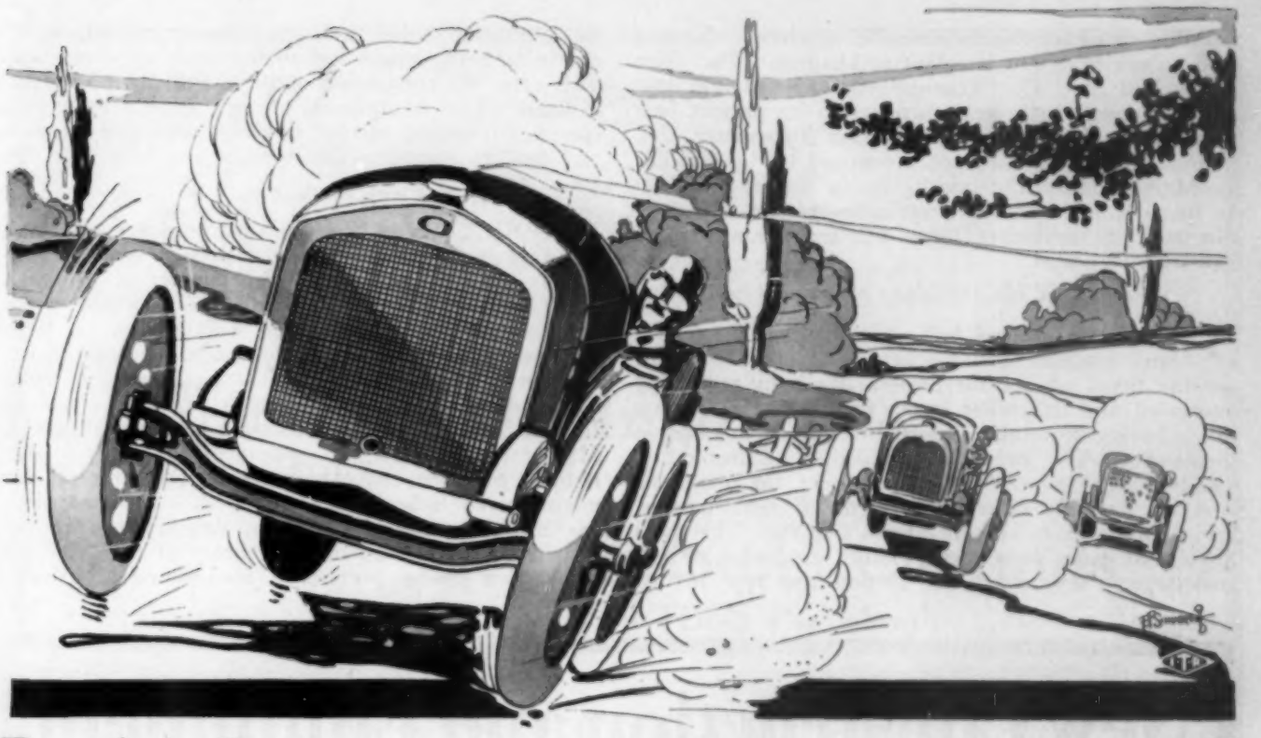
The Pusey & Jones Co., Wilmington, Del., has let a contract for the construction of an erecting shop. Gilbert & Barker Mfg. Co., West Springfield, Mass., has let a contract for seven additions. Westinghouse Electric & Mfg. Co. has bought a site at Chester, Pa., and will erect a plant. Standard Aero Corporation, Plainfield, N. J., has let a contract for a large machine shop. Ever Ready Tool Co., Bridgeport, Conn., has let a contract for an addition. American Brass Co. will build an extensive addition at Waterbury, Conn. International Time Recording Co., Endicott, N. Y., will erect a large building. Worth Bros. & Co., Widener building, Philadelphia, have selected F. B. Graser, engineer, Commercial Traders' building, that city, to prepare plans for a steel plant. Mauch Chunk Iron Works, Mauch Chunk, Pa., will add to its foundry. Raritan Copper Works, Perth Amboy, N. J., will add a machine shop and a foundry. Market Forge Co., Chelsea, Mass., will build a plant at Everett, Mass. Connecticut Electric Steel Co., 50 Church street, New York, will build a plant at Hartford, Conn. Warsaw Elevator Co., Warsaw, N. Y., is about to extend its plant.

Chicago Market Still Active

CONTRARY to custom, the hot months are bringing an unexpected volume of business to Chicago dealers. July sales proved much heavier than was expected and the amount of business concluded to date for the month of August is keeping up to the previous level. Inquiry from domestic sources is gratifying and seems to be on the increase after a slight recession recently when other lines of business also seemed to slow up. Inquiries are being received from users of almost every sort of tool and railroads are buying single tools or small lots. A recent inquiry from the Santa Fe railroad asked for five lathes. Second-hand machinery in good condition is easily placed and whatever equipment of this sort comes into the possession of dealers usually can be disposed of immediately. The only second-hand machinery which moves slowly is small screw machines and small engine lathes, which are being thrown on the market by concerns which have completed contracts for fuses or small shells.

Market Easy in Pittsburgh

THE market for machine tools and rolling mill equipment at Pittsburgh is less active than it was a few months ago, when munition makers were buying tools in lots of several hundred each, but a heavy volume of business continues to be enjoyed. Foundries and machine shops engaged in building heavy machinery have enough orders on their books to maintain present operating rates for from six to 10 months, and most builders of cranes are unable to promise deliveries in less than six months. Nearly every manufacturer in western Pennsylvania and eastern Ohio has purchased from one to a dozen tools this year, and numerous inquiries are pending. The Carnegie Steel Co. has completed plans for the



A Car
is no stronger than its Axle--
THEREFORE
AGATHON STEELS

are in great demand by automobile manufacturers.

The manufacturer well knows that every broken axle, no matter under what circumstances it happens, means a "black eye" for his machine.

Therefore he specifies **Agathon Steels.**

And there are many other parts of his products that are subjected to tremendous strains—therefore, for these parts **also,** he specifies **Agathon Steels.**

Agathon Steels are made of a combination of basic pig iron and the best selected scrap, in a strictly up-to-the-minute plant that is equipped with the highest grade machinery, and every department of which is under the control of highly efficient men.

In **Agathon Steels** we have set a **higher** standard—to fill the demands of the **particular.**

OUR PRODUCTS

"AGATHON" Chrome Nickel
"AGATHON" Chrome Vanadium
"AGATHON" Nickel Steels
"AGATHON" Special Analyses
"AGATHON" Vanadium
"AGATHON" Silico-Manganese
"AGATHON" Chrome Steel
"AGATHON" High Carbon

AGATHON STEELS

THE CENTRAL STEEL CO.
MASSILLON, OHIO
DETROIT OFFICE—326-27-28 Ford Building, F. Walter Guibert, District Representative
CLEVELAND OFFICE—Hickox Building, The Hamill-Hickox Co., District Representative
CHICAGO OFFICE:—Room 1511-12 Lytton Bldg., 14 East Jackson Blvd., Mr. A. Schaeffer, District Representative
PHILADELPHIA OFFICE:—902 Widener Bldg. Frank Wallace, District Representative

AGATHON STEELS

installation of a 12-inch bar mill, an electric furnace and an ore bridge at its plant at Duquesne, Pa. The Brier Hill Steel Co., Youngstown, O., will add two 100-ton open-hearth steel furnaces to its present battery of 10 furnaces. The Corona Typewriter Co., Groton, N. Y., has awarded a contract to the McClintic-Marshall Co., Pittsburgh, for a 4-story addition to its plant, and will buy electrically operated machines for making typewriter parts. A new power plant also will be added.

Cleveland Market Listless

THERE is a decided lack of activity in the Cleveland machine tool market. The stock of tools on the floors of several dealers has been noticeably increased and one seller states that he is loading up for a buying movement, which is expected to come in September. The Babcock & Wilcox Co., Barberton, O., has been awarded a large contract for munitions and has recently closed on its list of requirements, which are said to involve about $25,000. The tools purchased were large-swing lathes, 24-inch, 26-inch and larger. It is interesting to note that few, if any, single-purpose lathes were purchased; provision evidently is being made for further use of these new tools after the completion of the munition orders now in hand. This condition is giving rise to considerable speculation on the part of single-purpose tool builders and dealers handling this type of machine.

Hot Weather Slackens Cincinnati

PRODUCTION in Cincinnati machine shops is being slightly handicapped by the present weather conditions and the fact that a large number of workmen are taking vacations. Foundries in Cincinnati and Hamilton, O., are well stocked with orders. A large engineering company in Detroit made repeated efforts to have a number of 5-ton castings made in those cities last week, but not a single foundry could be found that could make deliveries for several weeks. Makers of light electrical equipment are busy; a large number of orders have been received for motors for motor-driven lathes and planers. No important lists for machine tools for foreign delivery are in the Cincinnati market, as manufacturers in that city are showing a strong preference for domestic business.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

Among New England Factories

AUGUSTA, ME.—The Burdyette Oxygen Co. has been incorporated to make oxygen and hydrogen gases. The company is capitalized at $300,000 by Ernest L. McLean, E. J. Noble and E. M. Leavitt, Winthrop, Me.

AUGUSTA, ME.—The Minnesota Power Co. has been incorporated to construct and manage heating and power plants, railways and other public works. The company is capitalized at $2,000,000 by Frank E. Corson, Fargo, N. D.; Norman Nelson, St. Paul, Minn.; E. B. Turner, L. J. Coleman and R. S. Buzzell.

PORTLAND, ME.—Leopold Loevin, Jacksonville, Fla., and New York City, contemplates erecting a 150 x 250-foot canning factory and warehouse in Portland.

LANCASTER, N. H.—Jones & Linscott have let a contract to the H. P. Cummings Construction Co., Ware, Mass., for the erection of a hydro-electric power plant addition.

PROCTOR, VT.—The Vermont Marble Co. will build a brick, stone and steel, fireproof, 3-story and basement, 60 x 100 foot office building to cost $60,000.

SWANTON, VT.—I. W. Jones, engineer, Milton, N. H., is preparing plans for a hydro-electric plant to be built at Highgate, Vt., at a cost of $75,000 for the borough of Swanton.

AMESBURY, MASS.—Bids will be taken Aug. 21 for a brick, fireproof high school to cost $125,000 on Main street.

AMESBURY, MASS.—The Merrimac Valley Power & Building Co., 19 Congress street, Boston, will build a hydro-electric power plant at Amesbury.

ATTLEBORO, MASS. — The Crown Mfg. Co. has awarded a contract for a brick, mill-construction, 4-story, 209 x 230-foot addition to its main plant in South Attleboro, to cost $200,000.

ATTLEBORO, MASS.—The Frank Mossberg Co., which operates one of the largest machine shops in this section, has bought the $50,000 factory which the chamber of commerce erected for it in 1909.

BOSTON.—The Hurlburt, Cabot & Rollins Corporation has been awarded the contract to rebuild the Essex bridge between Salem and Beverly, Mass., for $171,367.

BOSTON. — Albert Geiger Jr., will build a brick and stone, fireproof, 3-story, 100 x 125-foot building at Warren avenue and Clarendon street to cost $143,000.

BROCKTON, MASS.—Plans are being figured for a brick, stone and steel, 2-story and basement, 35 x 170-foot addition with an ell, 50 x 50 feet, to cost $90,000, for the Winthrop school, Montello.

CAMBRIDGE, MASS.—Ernest Flentje, 1643 Cambridge street, will build a 2-story, 60 x 70-foot plant addition.

CHELSEA, MASS.—The Market Forge Co., Chelsea, will build a 2-story, 48 x 200-foot plant at Everett, Mass., to cost about $20,000. S. S. Eisenberg, architect, Chelsea, is preparing the plans.

EVERETT, MASS.—The Everett Factories Corporation will build a brick and steel mill-construction, 4-story, 124 x 148 x 167-foot factory to cost $60,000 at Charlton street and Broadway.

HOLYOKE, MASS.—The Buchanan & Holt Wire Co., Appleton street, has let a contract to the Casper Ranger Construction Co. for the erection of a 2-story and basement, 46 x 50-foot addition.

MEDFORD, MASS.—Plans are being drawn for a brick, stone and steel, fireproof, 3-story and basement, 65 x 125-foot city hall on Main street to cost $200,000 for the city of Medford.

NEW BEDFORD, MASS.—The Rôtch Mills will build an 80 x 175-foot addition to its No. 1 mill and a 30 x 75-foot addition to its No. 2 mill.

PITTSFIELD, MASS.—The Kinney Woolen Mfg. Co. will build a 2-story, 60 x 200-foot woolen mill to cost about $100,000.

QUINCY, MASS.—The Fore River Shipbuilding Corporation has let a contract to Westinghouse, Church, Kerr & Co., 37 Wall street, New York, for the erection of a 2-story, 40 x 60-foot pattern and joiner shop.

SALEM, MASS.—Frederick E. Warner will build a reinforced concrete, 3-story public garage on Sewall street.

WORCESTER, MASS. — The Graton & Knight Mfg. Co. has let a contract for the erection of a 4-story, 63 x 70-foot plant addition.

WORCESTER, MASS.—The Baldwin Chain & Mfg. Co. is to establish a branch factory in Worcester as soon as a suitable location can be found in which its heavy machinery and presses can be installed.

EAST PROVIDENCE, R. I.—The Abrasive Machine Tool Co. which is to be incorporated shortly, has been granted a 10-year exemption from taxation on a reinforced concrete, 50 x 150-foot factory with an ell, 25 x 30 feet, which it will erect on Massasoit avenue.

PROVIDENCE, R. I.—The Universal Winding Co. has awarded a contract for a steel frame, 2-story, 28 x 96-foot storage building on Elmwood avenue.

PROVIDENCE, R. I.—E. T. Davis, Springfield, Mass., has awarded a contract for a

Electric Steel

For Immediate Delivery

Electric Steel Ingots

500 TONS Per Month

Electric Steel Castings

300 TONS Per Month

Alloy Steel Castings or Ingots Made to Specifications

THIS is your opportunity to contract for your requirements of Steel Ingots or Castings. The output of our new Electric Steel Plant, which has just been completed and placed in operation, has not yet been contracted for.

The plant is equipped with a Three-Ton Heroult Electric Furnace and is the outgrowth of our crucible steel casting business.

Our organization is trained in electric steel production and steel casting manufacture and we can guarantee a product of the highest quality.

Send Us Your Specifications

Racine Steel Castings Co.

RACINE, WIS.

Owned and operated by the

Belle City Malleable Iron Co., Racine, Wis.

brick and steel, mill-construction, 2-story, 50 x 100-foot public garage at West Exchange and Bradford streets.

BRIDGEPORT, CONN.—The Metropolitan Automobile & Carriage Co. will build a brick, 2-story, 58 x 110-foot addition on Hurd avenue.

BRIDGEPORT, CONN.—The Elliott Mfg. Co. will build a mill-construction, 1-story, 45 x 130-foot plant at Railroad and Iranistan avenues.

BRIDGEPORT, CONN. — The Precision Gauge & Tool Co. has been organized with $10,000 capital by Gustave Gabriel, John J. Parker and Frieda Gabriel.

BRIDGEPORT, CONN. — The Bridgeport Piston Ring Co. has been organized with $32,000 capital by Adolph Kregling, Karl Bitzer and Arthur W. Palmer.

BRIDGEPORT, CONN. — The Ever-Ready Tool Co. has let a contract to the S. W. Hubbell Building Co. for the erection of a 1-story, 42 x 95-foot plant addition.

BRIDGEPORT, CONN.—Kirby Thomas, architect, 120 Broadway, New York City, is preparing plans for rebuilding a plant at Bridgeport for the American Electrical Equipment Co., 115 Broadway, New York City.

BRIDGEPORT, CONN. — The American Power Co. has been incorporated to make engines, motors and parts. The company is capitalized at $100,000 by John J. Hogan, John T. Hubbard and John G. Hoffman, New York.

BRISTOL, CONN.—The Turner Construction Co., New York, has been awarded the contract to build a reinforced concrete fireproof, 4-story, 160 x 222-foot ball bearing plant for the New Departure Mfg. Co.

CHESHIRE, CONN.—The Connecticut Brass Co. has let a contract to the H. Wales Lines Co. for the erection of a 1-story, 40 x 140-foot casting shop.

HARTFORD, CONN.—Wise, Smith & Co. will build a brick, 2-story, 71 x 80-foot block to cost $25,000 at 48-54 Pratt street.

HARTFORD, CONN. — The Connecticut Electric Steel Co., 50 Church street, New York City, is starting work on the erection of a 125 x 158-foot plant at Hartford.

MIDDLETOWN, CONN.—The Russell Mfg. Co. will build a reinforced concrete, 1-story, 48 x 150-foot weave shed at its plant in South Farms.

NEW BRITAIN, CONN.—W. H. Cadwell, architect, 213 Main street, is preparing plans for a 6-story and basement, 40 x 114-foot plant addition for the Beaton & Cadwell Mfg. Co.

NEW BRITAIN, CONN.—The North & Judd Mfg. Co. has let a contract to the R. H. Hibbard Co. for the erection of a 2-story and basement, 45 x 55 and 37 x 53-foot power house and factory building.

NEW HAVEN, CONN.—The Progressive Tool Equipment Co. has been incorporated with $50,000 capital by Kent L. Bradley, Henry B. Thomson and Robert H. Chirgwin, Shelton.

NEW LONDON, CONN. — The state of Connecticut has awarded a contract for a brick, mill-construction, 2-story, 100 x 100-foot warehouse and sheds at the state pier.

NORWALK, CONN.—M. N. Mayehoff & Co. will build a brick, mill-construction, 3-story addition to their factory at Merwin street and West avenue to cost $15,000.

ROCKVILLE, CONN.—E. J. Martin Sons have let a contract for the erection of a 3-story, 52 x 112-foot factory building.

STAFFORD SPRINGS, CONN.—Plans have been drawn for a brick, 1-story, 200 x 300-foot building and a brick, 1-story, 50 x 200-foot building to cost $200,000 as additions at the Fox Village plant of the Rhode Island Worsted Co.

THOMPSONVILLE, CONN.—The Standard Metal Work Co. which recently took over the G. H. Bushnell Press Works, has been incorporated with a capital of $300,000 by Mark W. Bushnell and Guy F. Bushnell.

WATERBURY, CONN. — The Houstonic Power Co. will spend $100,000 in additions and improvements in the equipment of its turbine station.

WATERBURY, CONN. — The American Brass Co. has let a contract to the Sperry Engineering Co., New Haven, for the erection of a 3-story, 75 x 150-foot plant addition at Waterbury.

From the Alleghenies to the Sea

ALBANY, N. Y.—C. A. Simmons Machine Co., 985 Broadway, has let a contract to John Dennis, Kinderhook, N. Y., for the erection of a 1-story, 125 x 131-foot machine shop to cost about $10,000.

BROOKLYN, N. Y.—Henry Hermendinger, 9 Washington avenue, has completed plans for the erection of a 1-story, 85 x 188-foot plant to cost about $25,000.

BUFFALO.—Acme Pattern & Machine Co., 38 Letchworth street, is about to let a contract for the erection of a 2-story, 100 x 176-foot plant.

BUFFALO. — W. F. Emerson, 196 Winchester avenue, is about to let a contract for the erection of a 2-story, 40 x 55-foot factory and office building.

BUFFALO.—The Multi-Machine Co. has been incorporated to manufacture tools, machines, engines, boilers, supplies, etc. The new concern is capitalized at $50,000 by A. E. Davenport, H. J. Ernst and W. E. Gieckel, Buffalo, at $50,000 by A. E. Davenport, H. J. Ernst and W. E. Gieckel, Buffalo.

ELMHURST, L. I., N. Y.—Francisco & Jacobus, architects and engineers, 200 Fifth avenue, New York City, are taking bids on the general contract for a 4-story, 70 x 320-foot ball bearing plant and a 1-story, 40 x 60-foot power plant to be erected at Elmhurst for the Norma Co. of America.

ENDICOTT, N. Y.—International Time Recording Co., G. W. Fairchild, president, has let a contract to A. E. Badgeley, Birmingham, N. Y., for the erection of a 50 x 200-foot factory building.

MANHATTAN, N. Y.—The Toledo Machinery Patents Co. has been incorporated to manufacture machinery, tools and other articles. The new company is capitalized at $100,000 by R. L. Ellery, Monroe street, Toledo, O., and J. B. Kirkman, W. Dierman, 44 Whitehall street, New York City.

NEW YORK.—The Long Island railroad is inquiring for bids on a 25-ton, yard gantry crane.

NEW YORK.—Pyrites Co., A. D. LeDoux, 15 William street, has let a contract for the erection of a 1-story, 80 x 100-foot sintering plant.

NEW YORK.—Alt Realty Co., 15 West Forty-fifth street, has completed plans for the erection of a 16-story, 33 x 96-foot factory building to cost about $100,000.

ROCHESTER, N. Y.—Block & Diemer, architects, Mercantile building, have completed plans for an addition to the plant of the Gondlach-Manhattan Optical Co.

ROME, N. Y.—F. W. Kirkland, architect, is preparing plans for a 1-story, 40 x 130-foot factory building.

SCHENECTADY, N. Y.—American Locomotive Co. has let a contract for the erection of a 2-story, 55 x 200-foot foundry addition. It is preparing plans for another foundry addition, 1-story, 100 x 175 feet.

SYRACUSE, N. Y.—Will & Baumer will build a 3-story, 70 x 178-foot factory addition which will cost about $300,000 including equipment.

SYRACUSE, N. Y.—The Syracuse Forging & Machine Works has been incorporated to do a forging and foundry business. The new company is capitalized at $550,000 by H. F. Butler, F. M. Hennesey and C. H. Goebel, Syracuse.

TONAWANDA, N. Y.—Acheson Graphite Co., Niagara Falls, is preparing plans for three 1 and 2-story factory buildings to be erected at Tonawanda at a cost of $150,000.

WARSAW, N. Y.—Warsaw Elevator Co. is taking bids on the steel for a 1-story, 45 x 100-foot addition.

WELLSVILLE, N. Y.—Moore Steam Turbine Co. will build a 2-story, 80 x 100-foot plant.

BOONTON, N. J.—E. I. Du Pont de Nemours & Co. have purchased the old Norton Iron Works plant and are equipping it as a brass and bronze foundry.

BOUND BROOK, N. J.—The Cott-A-Lap Co. will build a large plant at Bound Brook. It will include a 3-story, 40 x 140-foot office building, a 1-story, 27 x 80-foot refrigerating building, a 60 x 500-foot factory building, a 35 x 60-foot nitrating building, a 2-story, 48 x 108-foot reduction building, a 20 x 25-foot gate house and a 1-story, 50 x 112-foot switch house.

FRANKLIN PARK, N. J.—Samuel A. Adler is having plans prepared for a 2-story, 32 x 100-foot plant to be erected at Franklin Park.

HOBOKEN, N. J.—The R. G. Davis Co. has let a contract for the erection of 5-story, 100 x 200-foot factory addition.

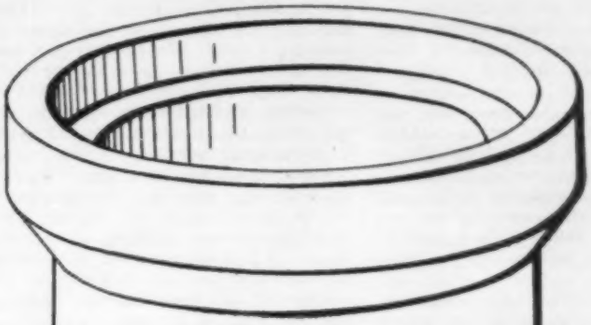
JERSEY CITY, N. J.—The Kiernan, Hughes Co., 348 Smith street, has let a contract for the erection of a 4-story, 25 x 100-foot addition to its paper box plant.

JERSEY CITY, N. J. — The International Elevator Co. has purchased from the American Coal Co. a 100 x 200-foot site including titles to piers at Morris and Essex streets. The International company, which operates floating grain elevators, will utilize the property for a repair shop and basin.

NEWARK, N. J. — The National Lock Washer Co., 65 Johnson street, has let a contract to the J. F. Dey Co. for the erection of a 17 x 113 and 12 x 28-foot addition.

NEWARK, N. J.—The American Synthetic Dyes Co., Avenues P and R and Newark

-CON-



FACTORY MADE

REINFORCED CONCRETE PIPE

-PRO-CO-

Round Pipe

FOR

Railroad

AND

Highway Culverts
Trunk Sewers, Drains

AND

Low Pressure Mains

12" TO 72" SIZES
USED BY
STATE and COUNTY
HIGHWAY DEPARTMENTS
CITIES
BOROUGHS
TOWNSHIPS
STEAM and ELECTRIC
RAILROADS
STEEL WORKS
COAL COMPANIES
FILTER and SEWAGE PLANTS
ETC.

Concrete Products Co.
OF PITTSBURGH

General Offices
803 DIAMOND BANK BUILDING
PITTSBURGH, PA.

—QUALITY —

— ECONOMY—

Transfer, has been granted a permit to erect two factory additions and two steel tanks.

NEWARK, N. J.—The P. H. Seery Tube Co. has been incorporated to manufacture metal tubes. The new company is capitalized at $100,000 by Peter H. Seery, Irving P. Seery and James W. Fitzpatrick, Newark.

PASSAIC, N. J.—The Gera Mills Co. will build a 1-story, 108 x 128-foot addition to cost about $25,000.

PERTH AMBOY, N. J.—The Raritan Copper Works will build a 2-story, 33 x 40-foot foundry addition and a 1-story, 48 x 48-foot machine shop addition. A. C. Clark, superintendent, will receive the bids.

PLAINFIELD, N. J.—The Standard Aero Corporation, 768 North avenue, has let a contract to the Anchor Corrugating Construction Co., 140 Washington street, New York City, for the erection of a 1-story, 65 x 160-foot machine shop.

PROXTON, N. J.—The Erie railroad will build a locomotive terminal at Proxton.

ROOSEVELT, N. J.—The United States Metals Refining Co. has let a contract for the erection of a 2-story, 50 x 150-foot laboratory.

TRENTON, N. J.—The John Bartley Crucible Co. has let a contract for the erection of a 3-story, 75 x 100-foot plant addition to cost about $25,000.

TRENTON, N. J.—W. P. Enderbrook, architect, American Mechanics building, is preparing plans for a 2-story, 40 x 64-foot electrical building to be erected for the city of Trenton.

VINELAND, N. J.—The borough of Vineland is taking bids on the construction of an 87 x 96-foot power plant with 28 x 58-foot wing.

CATASAUQUA, PA.—Jacoby & Weishampel, architects, Allentown, are preparing plans for a 2-story, 25 x 33-foot plant to be erected at Catasauqua for the Lehigh Thermometer Co.

CHESTER, PA.—Robt. Howarth Sons will build a 2-story, 70 x 110 and 20 x 70-foot factory building.

HARWOOD, PA. — The Harwood Electric Co., with an office at Hamilton, Pa., will build a 1-story power plant addition at Harwood.

MAUCH CHUNK, PA.—The Mauch Chunk Iron Works, A. E. James manager, will start work shortly on an addition to its foundry.

NEW CASTLE, PA.—Johnson Bronze Co., formerly the American Ship Hardware Co., has let a contract to the Anderson Construction Co., New Castle, for the erection of improvements to cost about $85,000. These will include a new bronze foundry and a boiler house.

NICHOLSON, PA.—The Lackawanna Cutlery Co. has been incorporated with $10,000 capital. Morris G. Hinkley is treasurer of the new company.

PHILADELPHIA.—Hardwick, Magee & Co., 1220 Market street, will build a 1-story blower house.

PHILADELPHIA.—The American Manganese Bronze Co., Holmesburg Junction, is taking bids on the erection of a 1-story machine shop.

PHILADELPHIA.—The H. B. Pancoast Co., Third and Locust streets, is about to build a machine shop, office building and storage shed to cost $20,000.

PHILADELPHIA.—F. B. Graser, engineer, 622 Commercial Traders' building, is about to start work on plans for a steel plant to be built for Worth Bros. & Co., Widener building.

PHILADELPHIA.—The Harshaw, Fuller & Goodwin Co. has let a contract to A. R. Raff, 265 Thompson street, for the erection of a 1 and 2-story, 150 x 200-foot addition to its plant at Philadelphia.

PHILADELPHIA.—The Hogg Construction Co. is estimating on plans for a 4-story, 58 x 200-foot factory building with two wings, 32 x 68 and 26 x 27 feet to be erected at Hazelton, Pa., for Louis Roessel & Co.

PHILADELPHIA.—F. W. Van Loon and the Fred A. Havens Co. are estimating on plans for a 2-story, 50 x 247-foot office, machine shop and store room to be erected at 946-62 North Front street for H. B. Pancoast & Co.

SOUTH BETHLEHEM, PA.—The Bethlehem Steel Co. is taking bids on a 25-ton single-leg gantry crane.

WEST APOLLO, PA.—The Apollo Refractories Co. has been incorporated with $10,000 capital by C. R. Stewart, Earl A. McKeever, Walter A. McGeary, S. A. McKeever Jr., Pittsburgh, and J. T. Stewart, Philadelphia.

WHEATLAND, PA.—William McIntyre & Sons are erecting a 2-story, fireproof pattern shop for the Sharon Foundry Co.

WILKINSBURG, PA. — The Pennsylvania Water Co. has awarded the Pittsburgh Construction Co., 1217 Fulton building, Pittsburgh, a contract for a filtration plant.

YORK, PA.—The Bell Motor Car Co. is preparing plans for a 1-story, 108 x 240-foot plant.

WILMINGTON, DEL.—The Pusey & Jones Co. has let a contract to Geo. F. Pawling & Co., 1432 South Penn square, Philadelphia, for the construction of a 2-story, 70 x 280-foot erecting shop at the foot of Poplar street, Wilmington.

BALTIMORE.—The United Railway & Electric Co. has let a contract for the erection of a transformer building to cost about $30,000.

BALTIMORE. — The Consolidated Gas & Electric Co., J. R. Loizaux, Liberty and Lexington streets, is preparing plans for a 1-story, 40 x 100-foot power plant.

BALTIMORE.—The Baltimore Enamel & Novelty Co., A. P. Claridge, Woodall and Clement streets, is having plans revised by G. E. Painter, 32 North Charles street, for a 2-story, 177 x 411-foot addition to cost about $150,000.

Activities in the Central States

AKRON, O.—Railroad engineers have presented figures to the city of Akron and the Akron chamber of commerce which show the cost of eliminating grade-crossings between Mill street and South Main street to be $2,500,000.

ALLIANCE, O.—Work has begun on a new 70 x 150-foot forge shop for the Morgan Engineering Co. The equipment will consist of one 3,000-ton hydraulic press, one 800-ton press and smaller presses in addition to tools.

ASHTABULA, O.—The Ashtabula Hide & Leather Co. will build a 3-story, 60 x 75-foot addition to its plant on Main street.

BROOKVILLE, O.—The Brookville Bridge Co. has the contract for the erection of the superstructure of the West Carrollton bridge at a cost of $33,700.

CINCINNATI.—The Barrett Co. has applied for a permit to erect a 2-story, brick and concrete, factory building and warehouse on Carr street to cost $16,000.

CINCINNATI.—The Cincinnati Planer Co. is in the market for two 4-ton traveling cranes with a span of 25 feet to be used in a new casting house now under construction.

CINCINNATI.—The Carlton Machine Tool Co. has purchased a large tract of land adjoining the Hoppel street viaduct upon which it will erect a 1-story, steel factory building.

CINCINNATI.—A boiler house, 65 x 76 feet, will be built by the Cincinnati Sanitarium. Equipment has not yet been purchased. Walter G. Franz, Cincinnati, is the engineer in charge of construction.

CLEVELAND.—William Plotz, 411 Champlain avenue, will build a 2-story, 50 x 180-foot factory building to cost $40,000.

CLEVELAND.—H. T. Jeffrey has incorporated the Doan Market Co. which will erect a $125,000 market house on East 105th street near Euclid avenue.

CLEVELAND.—The Cleveland Southwestern Railroad Co., Garfield building, has awarded contracts for the erection of freight houses at Ashland, Bucyrus and Mansfield.

CLEVELAND.—The Cavanaugh-Linn Co., 625 Citizens building, has a contract for the erection of the Portage street bridge for the city of Cuyahoga Falls at $17,000.

CLEVELAND.—County Engineer Stinchcomb announces that bids will be advertised this week for the construction of the approaches to the high-level bridge.

CLEVELAND.—The Electric Controller Co. has applied for a permit to erect a 5-story, steel and concrete, 91 x 169-foot factory and office building at 2698 East Seventy-ninth street to cost $150,000.

CLEVELAND. — W. C. Owen & Co., Leader-News building, has completed revised plans for a factory building, 84 x 240 feet, costing $40,000, for the Goldingson Co. of which J. M. Manor, East Liverpool, O., is manager.

CLEVELAND.—C. E. Comstock, architect, 110 West Fortieth street, New York City, is preparing plans for a baking plant for the Ward Baking Co. The proposed structure will be five stories, 200 x 250 feet and will cost $150,000.

CLEVELAND.—The Boldt Low Construction Co. has been awarded a contract by the American Stove Co. for the construction of new buildings in Cleveland to cost about $90,000. As previously noted, the new work will consist of a 1-story, brick, mill-construction supply building on Hough avenue, a 3-story building on Perkins avenue for the New Process stove division, and a 4-story addition to the Perkins avenue warehouse. An elevated railroad trestle extension, 200 feet long, will also be erected.

COLUMBUS.—The Columbus Railway Power & Light Co. will begin purchasing equipment soon for a new power plant, which will be 94 x 200 feet, and will cost $375,000.

COLUMBUS, O.—Lewis R. Lee, Huntington national bank building, is taking bids on the erection of a 1-story and basement, 94 x 200-foot power plant to cost $375,000 for the Columbus Railway, Power & Light Co.

DAYTON, O.—The Dayton Bridge & Erection Co. has been incorporated with $15,000 by A. S. Fox, H. H. Wogaman, Charles J. Fox, S. W. Chalmers and F. H. Snyder.

DAYTON, O.—Schenk & Williams, architects, 591 Arce building, are ready for bids on a 1-story, 270 x 1,000-foot factory build-

ing for the Domestic Engineering Co., of which E. A. Deeds, East First street, is president.

EATON, O.—A new court house to cost $250,000 will be erected at Eaton. Bids are being taken by the county commissioners. The structure will be 74 x 146 feet for which about 500 tons of structural steel will be required.

HAMILTON, O.—N. G. Hamerney, county commissioner, has presented plans for a bridge at Scherd's Crossing near Carrton which will be 150 feet long and will cost $20,000.

HAMILTON, O.—The New Foundry Appliance Co. has been incorporated to manufacture the Becker moulding frames. The new concern is capitalized at $25,000 by John A. and Caroline Weigel, Frank J. and Nellie G. Becker and George F. Dana.

HICKSVILLE, O. — The Maumee Valley Mfg. Co. has been incorporated to manufacture furniture. The new company is capitalized at $100,000 by J. D. Serrill, John S. Hull, William E. Simmons, H. M. Hartzler and Casper J. Horn.

LISBON, O.—A steel truss bridge will be built across river at Lisbon. County officials are taking bids.

MARION, O.—The plant of the Ohio Tractor Mfg. Co. has been purchased by W. H. Houghton and associates, of Marion. It will be used for the manufacture of auto trucks and motor hearses and considerable new equipment will be purchased.

MIDDLETON, O. — Paper making equipment will be needed by the Wardlow-Thomas Paper Co., which is building a 2-story paper mill to cost $20,000.

MIDDLETOWN, O.—George W. Martman, architect, is taking bids for the erection of 2-story paper mill to cost $20,000 for the Wardlow, Thomas Paper Co., 717 Vanderteer street, Middletown.

NILES, O.—The Stevens Metal Products Co. has been incorporated with $50,000 capital by Edward D. Thompson, William H. Stevens, H. M. Scriven, C. C. McConnell and H. A. Burgess.

SANDUSKY, O.—The New York Central railroad is arranging for the immediate construction of the Camp street subway which will cost $250,000.

SPRINGFIELD, O. — The Lucas - Miner Pump Co. has been incorporated with $30,000 capital by Charles O. Lucas, Clyde C. Miner, W. H. Cook, Henry E. Freeman and Roscoe C. Lorents.

TOLEDO, O.—The Harrison Railway Specialties Co. has been incorporated to manufacture a dust guard. The new company is capitalized at $100,000 by F. B. Harrison, manager of the Harrison Dust Guard Co., 2066 Robinwood avenue.

XENIA, O.—A steel truss bridge will be built over Little Miami river at Xenia. Plans not yet completed.

YOUNGSTOWN, O.—The Republic Iron & Steel Co. is about to erect a brick laboratory building at its open-hearth plant at Hazelton.

YOUNGSTOWN, O.—The American Pattern & Mfg. Co. has been incorporated to make patterns to be used in machine shops. The new company is capitalized at $25,000 by H. M. Kelley, Edmun Collins and others.

YOUNGSTOWN, O.—The William B. Pollack Co., Youngstown, has been awarded a contract for the erection of a blast furnace with a capacity of 800 tons daily, at the Worth Bros. Co. plant at Coatesville, Pa.

CLARKSBURG, W. VA.—The De Vore & McGormley Co., architect and engineer, Nasby building, Toledo, O., is preparing plans for a 1 and 2-story plant for the Owens Bottle Machine Co.

MOUNDSVILLE, W. VA.—Plans are now being prepared for a 4-story, concrete factory building to be erected at Moundsville for the Fostoria glass plant.

CONNERSVILLE, IND.—The Lexington-Howard Motor Co. will erect a 1-story, brick, 125 x 200-foot addition to its plant.

ELKHART, IND.—The Sidney Mercantile Co., manufacturer of metal specialties, is having plans made by A. H. Elwood & Son, architects, 129 South Main street, for an addition to its plant costing $15,000.

FORT WAYNE, IND.—The Fort Wayne Engineering & Construction Co. is building a plant for the manufacture of machinery.

FORT WAYNE, IND.—H. W. Meyer, architect, Old National bank building, will open bids this week for the erection of a 2-story and basement, 45 x 245-foot factory to be erected for the Horter Mfg. Co. at a cost of $30,000.

FRANKLIN, IND.—The National Mfg. Co., recently incorporated, will build a foundry.

INDIANAPOLIS, IND.—The Indiana Die Casting Co. will build an addition to its plant and equip it for die casting.

INDIANAPOLIS, IND. — The Root-Johnson Ventilating Co. has been incorporated to manufacture ventilators with $10,000 capital by Ralph C. Root, M. G. Root and William R. Root.

INDIANAPOLIS, IND. — The Universal Motor Products Co. has been incorporated to manufacture automobile parts with $100,000 capital by R. Davidson, A. P. Vestal and S. N. Chambers.

INDIANAPOLIS, IND. — The Hamilton Mfg. Co. has been incorporated to manufacture fuel feed systems with $15,000 capital stock by Charles O. Roemler, H. F. Rust and Bert C. Brown.

INDIANAPOLIS, IND.—The Holcomb & Hoke Mfg. Co., 1453 Van Buren street, will build a machine shop and assembling plant. McMeans & Tripp, 509 Majestic building, are the architects and engineers.

INDIANAPOLIS. — The Indiana Tank & Boiler Works has been incorporated to manufacture steel plate and sheet iron products. The new company is capitalized at $10,000 by J. E., R. R., and H. E. Bossingham and E. A. Craig.

KENDALLVILLE, IND.—Plans have been prepared for the erection of two additions to the plant of the McCray Refrigerator Co. The new structures will be a wood shop 100 x 120 feet, and a nickel plating works, 40 x 50 feet. A considerable amount of new machinery will be installed and contracts will be awarded this month.

LOGANSPORT, IND.—The Star Generator Co. has been incorporated to manufacture generators with $50,000 capital stock by Harry C. Metzger, Orpha Carter and Edgar E. Metzger.

NAPPANEE, IND.—The Nappanee Carriage Works has been incorporated to manufacture vehicles with $40,000 capital by Ira C. Strohm, David F. Miller and Roy R. Berlin.

CHICAGO.—The Acme Packing Co. will build a plant at Forty-fifth street and Western avenue to cost $250,000.

CHICAGO.—McClernan & Co., manufacturers of metal kitchen cabinets, will build a plant costing $35,000 at North Chicago.

CHICAGO HEIGHTS, ILL.—The Canady-Otto Mfg. Co., manufacturer of forges, blowers and drills, will build an addition costing $12,000.

CHICAGO.—The Albright-Neil Co., manufacturer of machinery, is planning to esect a plant costing $80,000 on Western avenue boulevard.

CHICAGO.—The Hughes Electric Heating Co., manufacturer of heating devices, will build a factory at Taylor street and Waller avenue, costing $150,000.

CHICAGO. — The Regal Model & Tool Works, 122 South Clark street, is building a plant for manufacturing special machinery, automobile parts and dies.

CHICAGO. — The Eastern Metal Refining Co., 4022 South Fifth avenue, has been incorporated with $10,000 capital stock by Benjamin E. Cohen, Richard F. Poulton and Isadore J. Berkson.

CHICAGO.—The Sanitary District of Chicago, Thomas A. Smith, president, 910 South Michigan avenue, will take bids soon on a pumping station near Wildwood, Ill., to cost $2,000,000.

CHICAGO.—The Arnold Co., 105 South LaSalle street, is contracting architect and engineer for the Pullman Co. in the erection of four large shops and crane runways to cost about $3,000,000.

CHICAGO.—The Chicago Telephone Co., 212 West Washington street, will build a 16-story building, 141 x 180 feet, costing $750,000. Holabird & Roche, 104 South Michigan avenue, are the architects.

CHICAGO. — The Pyle-National Co. will build a plant costing $250,000, including a 2-story machine shop, 132 x 230 feet, a warehouse, 1-story, 94 x 167 feet, a forge shop, 48 x 94 feet, a pattern shop, 48 x 62 feet, a power house, 62 x 80 feet, and a foundry, 79 x 236 feet. Davidson & Weiss, 53 West Jackson boulevard, are the architects.

CICERO, ILL.—The Crown Stove Works, Thirteenth street and Forty-sixth avenue, will build an addition costing $10,000.

MOLINE, ILL.—The H. J. Frank Co., Davenport, Ia., will build a 2-story foundry and machine shop at Moline.

PEORIA, ILL.—The Holt Mfg. Co., East Peoria, manufacturer of tractors, will build a 1-story, 116 x 250-foot steel frame foundry. A machine shop 206 x 216 feet is just being completed.

ROCK ISLAND, ILL.—The Moline Plow Co. has awarded a contract for its new plant to cost $500,000 to the Stone & Webster Co., 38 South Dearborn street, Chicago.

BAY CITY, MICH.—A permit has been issued to the Young Cattle & Packing Co. for the erection of a 2-story, 60 x 100-foot plant on Salisbury avenue.

DETROIT.—The Holihan Mfg. Co., manufacturer of sheet metal products, is building an addition.

DETROIT.—The Sewell Cushion Wheel Co. is building a plant on East High street, to cost $40,000. H. J. Sewell, 1300 Gratiot avenue, is president.

DETROIT.—The Ireland & Mathews Sheet Metal Co., George H. Barbour, president, 51 Iron street, will build a plant, the main building being four stories, 60 x 600 feet, the press room, one story, 90 x 200 feet and the foundry, two stories, 60 x 120 feet.

GRAND RAPIDS, MICH. — The Alden Gear Control Co., recently organized, will build a factory to manufacture a gear shift control device for automobiles.

MUSKEGAN HEIGHTS, MICH. — The Enterprise Foundry Co. is erecting a 2-story, brick and steel addition to its plant. The new structure will be 50 x 150 feet and will be used as a casting and machine shop.

PORT HURON, MICH. — The Grand Trunk railroad has approved a bond issue of $750,000 to construct its shops in Port Huron.

KOHLER.—The Kohler Mfg. Co. will build a 1-story addition, 75 x 300 feet.

MILWAUKEE.—The General Welding & Mfg. Co. will build a factory on Oregon street. C. J. Keller is the architect.

MILWAUKEE.—The Geuder, Parchke & Frey Co., Sixteenth and Canal streets, is building an addition for the manufacture of stampings and metal specialties.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$21.00
Bessemer, Pittsburgh	21.95
Basic, Pittsburgh	18.95
Basic, eastern Pa.	19.00 to 19.50
Basic, Buffalo	19.00 to 19.50
Malleable, Pittsburgh	19.45
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.00 to 21.50
Malleable foundry, Buffalo	18.50 to 19.00
No. 1X foundry, Philadelphia	20.00 to 20.50
No. 2 foundry, Pittsburgh	19.45
No. 2 foundry, Cleveland	18.50 to 19.00
No. 2 foundry, Ironton	18.50 to 19.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	19.50 to 20.00
No. 2X foundry, N. J. tidewater	19.75 to 20.25
No. 2X foundry, Buffalo	18.50 to 19.00
No. 2 plain, Philadelphia	19.00 to 19.50
No. 2 plain, N. J. tidewater	19.25 to 19.75
No. 2 plain, Buffalo	18.25 to 18.75
No. 2 southern, Birmingham	13.50 to 14.50
No. 2 southern, Cincinnati	16.40 to 17.40
No. 2 southern, Chicago	18.00 to 19.00
No. 2 southern, Phila. delivery	18.50 to 19.50
No. 2 southern, Cleveland	18.00 to 19.00
No. 2 southern, New York docks	18.00 to 18.50
No. 2 southern, Boston docks	18.25 to 18.75
No. 2 south. interior, New Eng.	19.00 to 20.00
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X, furnace	18.50 to 19.00
Virginia 2X, Philadelphia	21.25 to 21.75
Virginia, No. 2X, Jersey City	21.00 to 21.50
Virginia 2X, Boston points	21.75 to 22.25
Gray forge, eastern Pa.	18.00 to 18.50
Gray forge, Pittsburgh	18.95
Gray forge, Birmingham	12.50 to 13.50
Silveries, 8 per cent, furnace	24.00 to 27.00
Silveries, 8 per cent, Chicago	31.50
Low phos. Standard, Phila.	32.00 to 34.00
Low phos. Lebanon, Pa. furnace	29.00 to 31.00
Low phos. Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	19.75 to 22.25
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bess., 51½ per cent, ton	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	8.5c to 8.75c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)
(Prices nominal.)

Foreign Bess., 50 to 65 per cent	8 to 8½
For'n non-Bess., 50 to 65 per cent	8 to 8½

COKE

(At the ovens.)

Connellsville furnace	$2.65 to 2.75
Connellsville fur., contract	2.40 to 2.50
Connellsville foundry, contract	3.15 to 3.40
Connellsville foundry	3.00 to 3.25
Wise county furnace, contract	2.85 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	2.85 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, prompt	$170 to 175
Ferro manganese, 80 per cent, seaboard, contract	175
Spiegel, 20 per cent, fur. early and last half	45.00 to 50.00
Ferro-silicon, 50 per cent, Phil.	83.00 to 85.00
Ferro-silicon, 50 per cent, Pbgh.	83.00 to 85.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $32.00; 10 to 11 per cent, $33.00; 11 to 12 per cent, $34.00; 12 to 13 per cent, $35.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billet, Phila	$45.00 to 50.00
Forging billets, Phila	65.00 to 70.00
Forging billets, Pbgh., nominal	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	55.00 to 60.00
Bessemer billets, Youngstown	43.00 to 45.00
Bessemer billets, Pittsburgh	43.00 to 45.00
Open hearth billets, Pittsburgh	43.00 to 45.00
Open hearth billets, Youngstown	43.00 to 45.00
Bess. sheet bars, Youngstown	43.00 to 45.00
Op. h'th sheet bars, Youngstown	43.00 to 45.00
Bess. sheet bars, Pittsburgh	43.00 to 45.00
Open hearth sheet bars, Pbgh.	43.00 to 45.00
Muck bars, Pittsburgh (nominal)	40.00 to 45.00

SKELP

Grooved steel skelp	2.50c
Sheared steel skelp	2.75c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh. & Chg. delivery after May 1, 1917	$33.00
Stan. op.-h'th rails, Pbg. & Chg. delivery after May 1, 1917	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—	
Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18
Buffalo to:—	
Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60
Virginia furnaces to:—	
Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88
Birmingham, Ala., to:—	
Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75
Chicago to:—	
Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58
Ironton and Jackson, O., to:—	
Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails, light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh.	2.50c to 2.60c
Structural shapes, Philadelphia	2.759c to 3.009c
Structural shapes, Chgo.	2.79c to 3.50c
Structural shapes, New York	2.769c to 3.019c
Tank plates, Chgo.	3.19c to 3.60c
Tank plates, Pittsburgh (con.)	2.90c to 3.00c
Tank plates, Pittsburgh	3.00c to 4.00c
Tank plates, Philadelphia	3.759c to 4.259c
Tank plates, New York	3.169c to 4.269c
Bars, soft steel, Chicago	2.79c to 3.50c
Bars, soft steel, Pbgh.	2.50c to 2.60c
Bars, soft steel, New York	2.669c to 2.91oc
Bars, soft steel, Philadelphia	2.659c to 2.905c
Hoops, carloads, Pittsburgh	2.75c to 3.00c
Bands, Pittsburgh	2.60c
Shafting, Pbgh., contr. carloads	15 to 20 off
Bar iron, Chgo.	2.35c
Bar iron, Philadelphia	2.559c
Bar iron, Cleveland	2.40c
Bar iron, New York	2.569c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c

SHEETS AND TIN PLATE

(Differentials indicated below are not now being closely followed.)

Bessemer.
BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.20c
Nos. 9 to 10 (base)	3.00c to 3.25c
Nos. 11 and 12	3.05c to 3.30c
Nos. 13 and 14	3.10c to 3.35c
Nos. 15 and 16	3.20c to 3.45c

Bessemer.
BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.55c to 2.80c
Nos. 22 and 24	2.60c to 2.85c
Nos. 25 and 26	2.65c to 2.90c
No. 27	2.70c to 2.95c
No. 28 (base)	2.75c to 3.00c
No. 29	2.80c to 3.05c
No. 30	2.90c to 3.15c

Bessemer.
GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.25c to 3.50c
No. 12	3.35c to 3.60c
Nos. 13 and 14	3.35c to 3.60c
Nos. 15 and 16	3.50c to 3.75c
Nos. 17 to 21	3.65c to 3.90c
Nos. 22 and 24	3.80c to 4.05c
Nos. 25 and 26	3.95c to 4.20c
No. 27	4.10c to 4.35c
No. 28 (base)	4.25c to 4.50c
No. 29	4.45c to 4.70c

No. 28, black, Chicago	3.09c to 3.19c
No. 28 galvanized, Chicago	4.59c
No. 10, blue annealed, Phila.	3.159c to 3.659c
No. 10, blue annealed, Chgo.	3.19c to 3.29c
Tin plate, 100 lb., coke base	$6.00

IRON AND STEEL PIPE

(Prices Adopted July 24, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	63	35½
½ in.	67	51½
¾ to 3 in.	70	55½
Lap weld:—		
2 in.	65	50½
2½ to 6 in.	68	53½
7 to 12 in.	65	49½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	52	24
⅜ in.	53	25
½ in.	57	38
¾ to 1½ in.	60	43
Lap weld:—		
1¼ in.	48	31
1½ in.	54	38
2 in.	55	39
2½ to 4 in.	57	42
4½ to 6 in.	57	42
7 to 12 in.	56	41

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	50 to 52
Iron, 3½ to 4½ inches, l. c. l.	40 to 42

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.60
Plain wire, jobbers', Pittsburgh	2.55
Galvanized wire, jobbers', Pbgh.	3.25
Polished staples, Pbgh.	2.75
Galvanized staples, Pbgh.	3.45
Barb wire, painted, jobbers' Pbgh.	2.75
Barb wire, galv., jobbers', Pbgh.	3.45

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ½ x 6 inches, smaller or shorter, rolled thread, 50 and 10, cut threads, 50, larger or longer, 40.

Machine bolts with hot pressed nuts ½ x 4 inches, smaller or short, rolled 50, 10 and 5; cut, 50 and 5; larger or longer, 40 and 10.

Cold pressed, semi-finished hexagon nuts, 60 and 10.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.90 off list; hot pressed hexagon blank or tapped, $2.90.

Cold pressed square, blank or tapped, $2.60 off; hexagon, blank or tapped, all sizes, $3.00.

RIVETS

Structural rivets, Pbgh	4.00c
Structural rivets, Chgo. delivery	3.50c
Boiler rivets, Pbgh	4.10c
Boiler rivets, Chgo. delivery	3.60c

STEEL SHEET PILING

(Pittsburgh)

Base sizes	2.50c to 2.60c

STANDARD STEEL CHAIN

Chain, ½ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inches and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$33.50 to 34.00
Six-inch and larger, Chicago	30.50 to 31.00
Six-inch Class B, New York	30.50
Four-inch Class B New York	33.50
Four to six-inch Birmingham	28.00
Six-inch and larger Birmingham	25.00

Light weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.10c
Steel squares, 2-in. & ov., Cleve.	3.75c
Steel rounds, 2-in. & ov., Cleve.	3.75c
Steel bars, under 2 in., Cleveland	3.25c
Steel bars, Detroit	3.20c to 3.25c
Steel bars, Philadelphia	3.00c to 3.25c
Steel bars, New York	3.00c to 3.25c
Steel bars, St. Louis	3.15c
Steel bars, Cincinnati	3.20c to 3.75c
Steel bars, St. Paul	3.20c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.20c
Iron bars, Detroit	3.20c to 3.25c
Iron bars, St. Louis	3.10c
Iron bars, Cincinnati	3.20c to 3.75c
Iron bars, Philadelphia	3.00c to 3.25c
Iron bars, New York	3.25c
Shapes, Chgo.	3.10c
Shapes, Detroit	3.20c to 3.25c
Shapes, St. Louis	3.15c
Shapes, St. Paul	3.20c
Shapes, New York	3.00c to 3.25c
Shapes, Cleveland	3.25c
Shapes, Philadelphia	3.00c to 3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.20c to 3.50c
Plates, Chgo.	3.50c
Plates, Detroit	3.60c to 4.00c
Plates, St. Louis	3.55c
Plates, St. Paul	3.60c
Plates, New York	4.25c to 4.50c
Plates, Cleveland	3.65c
Plates, Philadelphia	4.00c to 4.25c
No. 10 blue anl. sheets, Chgo.	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.40c to 3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chgo.	3.20c
No. 28 black sheets, Cleveland	3.20c to 3.25c
No. 28 black sheets, Cinci.	3.25c to 3.40c
No. 28 black sheets, Detroit	3.50c
No. 28 black sheets, St. Louis	3.30c
No. 28 black sheets, St. Paul	3.35c
No. 28 galv. sheets, Chgo.	5.25c to 5.50c
No. 28 galv. sheets, Cleveland	5.25c
No. 28 galv. sheets, Cincinnati	5.25c
No. 28 galv. sheets, Detroit	5.00c
No. 28 galv. sheets, St. Louis	5.30c to 5.50c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$18.75 to 19.25
Angle bars, steel, St. Louis	13.00 to 13.50
Arch bars and transoms, Chgo.	19.75 to 20.25
Arch bars and transoms, St. L.	19.75 to 20.25
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	7.50 to 8.00
Boiler punchings, Chicago	13.50 to 14.00
Bundled sheet, Cincinnati	8.25 to 8.75
Busheling, No. 1, Chicago	12.00 to 12.50
Busheling, No. 1, Cincinnati	10.00 to 10.50
Busheling, No. 1, Cleveland	11.00 to 11.50
Busheling, No. 1, St. Louis	11.75 to 12.25
Busheling, No. 2, Chicago	8.50 to 9.00
Cast borings, Chicago	6.00 to 6.50
Cast borings, Cincinnati	4.50 to 5.00
Cast borings, Cleveland	5.75
Cast borings, St. Louis	6.50 to 7.00
Cast, No. 1, Chicago	11.75 to 12.25
Cast, No. 1, Cincinnati	11.50 to 12.00
Cast, No. 1, Cleveland	12.50 to 13.00
Cast, No. 1, St. Louis	10.75 to 11.25

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—	
New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	68.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	13.75 to 14.25
Iron axles, St. Louis	23.50 to 24.00
Iron axles, Cleve.	23.00 to 24.00
Knuckles, coup., Chicago	14.00 to 14.50
Knuckles, coup., St. Louis	14.00 to 14.50
Locomtive tires, Chicago	20.00 to 20.50
Locomotive tires, St. Louis	20.00 to 20.50
Machine shop turnings, Chgo.	5.50 to 6.00
Machine shop turnings, Cleve.	5.75
Machine shop turnings, Cincinnati	6.00 to 6.50
Machine shop turnings, St. L.	6.75 to 7.25
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	10.00 to 10.50
Malleable, Cincinnati	8.25 to 8.75
Malleable railroad, Chicago	11.75 to 12.25
Malleable railroad, St. Louis	10.50 to 11.00
Pipes and flues, Cleveland	11.25 to 11.50
Pipes and flues, Chgo.	10.75 to 11.25
Pipes and flues, St. Louis	10.25 to 10.75
Railroad wrought, No. 1, Chgo.	15.25 to 15.75
Railroad wrought, No. 1, Cleve.	15.00
Railroad wrought, No. 1, St. L.	15.25 to 15.75
Railroad wrought, No. 1, Cinci.	13.00 to 13.50
Railroad wrought, No. 2, Chgo.	14.00 to 14.50
Railroad wrought, No. 2, St. L.	14.50 to 15.25
Shafting, St. Louis	$17.00 to 17.50
Spring, St. Louis	13.50 to 14.00
Springs, Chicago	14.25 to 14.75
Steel car axles, St. Louis	26.50 to 27.00
Steel car axles, Chicago	28.50 to 29.00
Stove plate, Chicago	9.25 to 9. 75
Stove plate, Cleveland	10.00
Stove plate, Buffalo	11.00 to 11.50
Stove plate, Cincinnati	8.00 to 8.50
Stove plates, St. Louis	8.00 to 8.50

(Gross tons.)

Axle turnings, Cleveland	$11.25 to 11.50
Busheling, No. 1, Buffalo	13.00 to 13.50
Busheling, No. 1, Pittsburgh	13.00 to 13.50
Busheling, No. 2, Buffalo	11.00 to 11.50
Bundled sheets, Pittsburgh	11.75 to 12.25
Bundled sheets, Cleveland	11.25 to 11.50
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels (iron), Pittsburgh	13.50
Car wheels (steel), Pittsburgh	17.00
Car wheels, Chicago	12.00 to 12.50
Car wheels, eastern Pa.	15.50 to 16.00
Car wheels, Buffalo	13.00 to 13.50
Car wheels, N. Y.	13.50 to 13.75
Car wheels, St. Louis	12.25 to 12.75
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	9.50 to 10.00
Cast borings, New York	7.00 to 7.50
Cast borings, eastern Pa.	10.00 to 10.50
Cast borings, Buffalo	8.00 to 8.25
Cast borings, Pittsburgh	8.00
Cast, No. 1, eastern Pa.	16.00 to 16.50
Cast, No. 1, Pittsburgh	14.50 to 14.75
Cast, No. 1, Birmingham	10.50 to 11.00
Cast, heavy No. 1, N. J. points	16.00 to 16.50
Forge, No. 1, eastern Pa.	12.50 to 13.00
Frogs, switches, guards, St. L.	15.00 to 15.50
Grate bars, Buffalo	11.50 to 12.00
Grate bars, N. J. points	11.25 to 11.50
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pittsburgh	16.00 to 16.50
Heavy melting steel, Buffalo	15.50 to 16.00
Heavy melting steel, Chgo.	14.75 to 15.25
Heavy melting steel, Cleveland	14.75 to 15.25
Heavy melting steel, Cincinnati	14.50 to 15.00
Heavy melting steel, eastern Pa.	14.75 to 15.25
Heavy melting steel, New York	13.00 to 13.50
Heavy melting steel, St. L.	14.50 to 15.00
Heavy melting steel, B'ham	10.00 to 10.50
Iron rails, Chicago	18.50 to 19.00
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	13.50 to 14.00
Iron rails, St. Louis	17.00 to 17.50
Iron rails, Cleveland	18.00
Iron axles, Pittsburgh	25.50 to 26.00
Iron axles, Cincinnati	20.00 to 20.50
Iron axles, eastern Pa.	27.00 to 28.00
Iron axles, Chicago	26.75 to 27.25
Iron axles, Buffalo	24.00 to 24.50
Low phos. steel, Buffalo	20.00 to 20.50
Low phos. steel, Pittsburgh	20.50
Low phos. steel, eastern Pa.	20.00 to 21.00
Machine shop turnings, Buffalo	7.00 to 7.50
Mch. shop turnings, New York	6.75 to 7.25
Mch. shop turnings, Pittsburgh	8.00
Mch. shop turnings, eastern Pa.	8.50 to 9.00
Malleable railroad, Cleveland	14.25 to 14.50
Malleable railroad, Buffalo	15.00 to 16.00
Malleable railroad, Pittsburgh	14.00
Malleable railroad, eastern Pa.	13.00 to 13.50
R. R. and mch. cast, No. 1 Bfl.	15.50 to 16.00
R. R. wrought, No. 1, Buffalo	17.25 to 17.75
R. R. wrgt., No. 1, eastern Pa.	19.50 to 20.00
R. R. wrgt., No. 1, New York	18.00 to 18.50
R. R. wrought, No. 3, Pbgh.	18.00 to 18.25
R. R. wrought, No. 1, B'h'm.	10.00 to 10.50
Reroll. rails, 5 ft. & ov., Pbgh.	16.50 to 17.00
Reroll. rails, 5 ft. & ov., Chgo.	15.50 to 16.00
Reroll. rails, 5 ft. & ov., E. P.	17.25 to 17.50
Reroll. rails, 5 ft. & ov., St. L.	16.00 to 16.50
Shafting, New York	20.00 to 20.50
Shafting, eastern Pa.	20.00 to 21.00
Shoveling steel, Chicago	14.25 to 14.75
Shoveling steel, St. Louis	12.50 to 13.00
Steel rails, short, Chicago	16.00 to 16.50
Steel rails, short, Cleveland	18.00
Steel rails, over 6 ft., Cleveland	14.50 to 15.00
Steel rails, old, B'h'm	10.50 to 11.00
Steel rails, short, St. Louis	15.00 to 15.50
Steel car axles, Birmingham	21.00 to 22.00
Steel car axles, New York	25.00 to 25.50
Steel car axles, Buffalo	24.00 to 24.50
Steel car axles, Cleveland	32.00
Steel car axles, Pittsburgh	26.50 to 27.00
Steel car axles, eastern Pa.	25.00 to 26.00
Stove plate, N. J. points	12.00 to 12.25
Stove plate, Birmingham	9.50 to 10.00
Stove plate, Pittsburgh	11.00 to 11.25
Stove plate, eastern Pa.	12.00 to 12.50
Wrought pipe, New York	10.25 to 10.75
Wrought pipe, eastern Pa.	12.50 to 13.00
Wrought pipe, Buffalo	12.00 to 12.50

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Prest-O-Lite Co., The, Indianapolis, Ind.

ACCUMULATORS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS.
(Hydraulic.)
Southwark Fdy & Mch. Co., Philadelphia, Pa.

AEROPLANE WIRE, STRAND AND CORD.
Roebling's, John A., Sons Co., Trenton, N. J.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Steel Co., Canton, O.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS.
(Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AXLES.
American Bridge Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS.
(Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS.
(Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES.
(Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING.
(Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS.
(Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS.
(Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago, Ill
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Steel Co., Canton, O.
Upson Nut Co., Cleveland, O.

BEAMS, CHANNELS AND ANGLES.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS.
(Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS.
(Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELLS.
(Marine and Locomotive.)
Vanduzen, E. W., Co., The, Cincinnati, O.

BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING.
(Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING.
(Chain.)
Link-Belt Company, Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES.
(Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES.
(Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Covington Machine Co., Covington, Va.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hinman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOCKS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.

BLOOMS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above